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Medicinal Marijuana: Therapeutic Criteria and Contraindications for Marginalized Populations of the Baby Boom Cohort

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Abstract

The purpose of this study is to present a systematic review of the available evidence-based literature to answer the question: What are the ways in which exposure to social change early in adulthood might enhance the likelihood that several marginalized groups within the Baby Boom cohort will accept medical marijuana as a viable therapeutic option as they age?

In this paper, I review the shift in the legal, cultural and therapeutic landscapes regarding medicinal marijuana and the impact this will have on several marginalized groups of an aging US population: those suffering with mental illness, veterans, and substance abusers. The impact on an already over-burdened healthcare system will be significant as the US will be ill-prepared to respond to the needs of the Baby Boom generation. The Baby Boomers came of age during the 1960s and 1970s when disruption and social change were commonplace, and they participated in activities which initiated or encouraged such change.

Studies in psychology and sociology have reached consensus that although medicinal marijuana has known therapeutic benefits, there are also considerable risks. However, legal field has less uniformity and displays considerable ambiguity in the laws in states where medical marijuana legalization has occurred. Politically motivated anti-drug campaigns may influence the perception of the dangers and risks, compromising efforts to change the public perception of marijuana as a legitimate therapeutic option. Conversely, that same perception may entice members of marginalized groups to experiment with marijuana without realizing the potential negatives.

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Introduction

During my graduate education, I took a course on aging and health which affected me in a number of ways. I was particularly interested in the sheer numbers of baby boomers, those people born between the years 1946-1964, and the impact of their reaching retirement age at about the same time. What impact might this have on an already overburdened healthcare system? By 2030 the entire baby boom will be aged 65 and older, all 79 million of us. Meeting the healthcare needs of 79 million older adults will stress both technological and healthcare resources. In the US, the baby boom can be roughly divided into two sub-cohorts: the leading-edge baby boomers born between 1946 and 1955, and the late boomers or trailing-edge boomers who were born between 1956 and 1964. Although there are significant differences between these two groups, one commonality they do share is their exposure to marijuana as young adults. Unlike any previous cohort, the baby boom was introduced to recreational marijuana during adolescence and had more familiarity with it than any prior cohort had even if they did not use it.

Why does this matter? The importance of early exposure to recreational marijuana in adolescence or early adulthood offered the opportunity to experiment with it without regard for consequences. Baby boomers who were first-time users typically had pleasurable, benign, low-risk experiences. According to the Encyclopedia Britannica, as sociologists try to explain drug-related behavior such as that experienced by boomers, they turned to Albert Bandura's social learning theory (1998). This perspective is based on the guiding principle that individuals engage in cognitive processing through observation or instruction -- that they learn from seeing others doing that which they have not yet done. Therefore, one might conclude that baby boomers hold norms and attitudes different from those of other cohorts because of the social and social psychological changes that occurred in the 1960s and 1970s. Because drug use was rampant at that time, one might postulate that these changes led to the baby boom being the first cohort that supported widespread marijuana use. Due to the fact that

they acquired these beliefs as young adults during a time of liberal social and political views, norms shifted for that cohort and marijuana became part of acceptable social behavior for at least a significant segment of these Americans. Now that medical knowledge suggests that marijuana has medicinal and therapeutic effects beyond simply getting high, can we expect the baby boomers to turn to marijuana for their physical and mental health needs in their later years perhaps more than any other cohort?

Marijuana is the dried leaves and flowers of the *cannabis sativa* plant. It is the most widely used illicit substance in the United States (Duncan, et al. 2010) and recent data indicates that rates of dependence and abuse among marginalized groups such as veterans have drastically risen in recent years (Boden, et al., 2013). Much of that use and abuse is likely tied to the increasing awareness of its therapeutic value in the treatment of significant diseases or to minimize side effects of pharmaceutical medications. Recent studies (e.g., Murphy et al., 2015; Lau et al., 2015) have explored how baby boomers may be concerned about harm reduction in the use of marijuana and will look to alternative means of administration such as vaping, edibles (brownies, cookies, and candies), and oils in order to minimize any negative outcomes. Cannabis oil is a thick, sticky substance made up of the two most prominent cannabinoids, cannabidiol (CBD) and delta-9-tetrahydrocannabinol (THC), extracted from the cannabis plant by separating the resins from the cannabis flower. Cannabis oil is the most potent of three main cannabis products which include the actual cannabis flower (marijuana), resin (hash), and oil (Murphy et al., 2015) Cannabis oil has been used medicinally to treat many conditions and can be ingested orally, vaporized into the lungs, and applied topically (Murphy et al., 2015).

Currently, 29 states and the District of Columbia have legalized marijuana for medicinal purposes (US.gov, 2017). Although there are a number of inconsistencies in these laws, medicinal marijuana laws are consistent across states in the following ways: (a) the individual must have one or more qualifying conditions; (b) a physician must document this and go on record with the state; (c) a

patient gets a state-issued card that qualifies him or her to possess marijuana; and (d) a patient either grows his or her own marijuana or obtains some from a caregiver, who may be providing primary care but who may also be responsible for the cultivation and transport of marijuana. These cards must be renewed on a regular basis to remain valid (Kondrad et al., 2013). Inconsistencies regarding possession and quantity, dispensaries, interstate travel and perhaps the most obvious, the fact that it contradicts federal law only add to public confusion around the possible therapeutic benefits.

The baby boom generation is like no other in that it has greater racial and ethnic diversity, worse levels of poverty, higher levels of education and more openness towards differences in sexual orientation. The baby boom also has produced fewer children, created higher divorce rates, and reported more mental health problems (Duncan et al., 2010). Any one of these differences could make baby boomers more vulnerable to substance abuse in their later years. Within the larger cohort, three subgroups exist that may be perceived as an invisible aging population: the mentally ill, substance abusers, and veterans. The fact that members of these groups all have a social disadvantage comes from the marginalization or rejection of them and their social norms by the society at large. The Baby Boomers came of age during the 1960s and 1970s when disruption and social change were commonplace, and they participated in activities which initiated or encouraged such change. What are the ways in which this exposure to social change early in adulthood might enhance the likelihood that these marginalized groups will accept medical marijuana as a viable therapeutic option as they age?

Chapter One: Review of the Evidence of Medicinal Marijuana Use

In this chapter the use of medicinal marijuana in the United States is explored from a historical perspective. A key factor in examining practices and motives is to understand the drug itself. It is important to understand who is currently using medicinal marijuana, what their motivations are, and what therapeutic benefits are associated with its use.

Historical glimpse

It is important to understand the history of marijuana in the United States (US) in order to understand the complexities across the various landscapes. Marijuana was legal in the United States until the early 1920s. Until then, the US Constitution afforded states the freedom to regulate health-related issues such as medical practice and pharmaceutical drugs. For much of the nineteenth century, physicians practiced medicine virtually unrestricted with limitless advertising and availability of drugs (Lyman, 2013). The Civil War triggered a drug epidemic resulting in hundreds of thousands of morphine addicts from the battlefields alone (Lyman, 2013). The use of morphine and commercially available opium-based drugs on the battlefields spread to the home front as many more self-medicated for grief and pain, resulting in increasing tolerance and eventually addiction (Lyman, 2013). On the West Coast of the US, opium use increased and became associated with the Chinese laborers who came to work on the railroads. Chinese opium smoking was accepted and encouraged until economic shifts turned Americans against these workers and their practice. As Lyman suggests, the importance of this attempt to link drug abuse with a particular culture may be one of the earliest examples of a powerful theme in the American perception of drugs: the association of drugs with a feared or rejected group within society (2013).

The absence of any federal control, and lack of uniformity in state laws, set the stage for legislation designed to change the public's attitudes towards drugs rather than representing a strategy

for reducing the supplies to users. Drug use significantly increased in the 1960s and 1970s; fortunately, a shift in drug control policy was finalized in 1970 when the Controlled Substances Act was passed, creating a common standard for the ranking and scheduling of all drugs (Lyman, 2013). All substances were categorized into five schedules theoretically based on criteria that included the medical use of the substance, its potential for abuse, and the likelihood for addiction. Marijuana was classified as a Schedule I drug, which indicates a high potential for abuse with no currently accepted medical value in treatment in the US and lack of evidence of drug safety (Lyman, 2013). Supported by the US Food and Drug Administration (FDA), this is the strictest classification and includes heroin, ecstasy and LSD. The Supreme Court ruled in 2005 that the commerce clause in the US Constitution allowed the government to ban the use of cannabis, even for medicinal use (Lyman, 2013).

An attempt to decriminalize marijuana was debated before a Presidential Commission in 1972 following the rising number of arrests for marijuana charges in the 1960s and early 1970s. Federal law penalties were reduced for marijuana violations and the Carter administration even went so far as to formally advocate for legalization of up to an ounce of marijuana (Lyman, 2013). Eleven states decriminalized penalties for possession of marijuana and in 1980, 53% of Americans were in favor of legalization compared to only 27% in 1986. Deadly designer synthetic drugs emerged in the US in the 1980s, which also saw an upsurge in organized crime and drug-related gang violence (Lyman, 2013). As gang violence and anti-drug campaigns, the most famous being Nancy Reagan's "Just Say No" campaign increased, so did drug use (Lyman, 2013). National attention faded as drug use declined in the 1990s but a recent upsurge in synthetic drugs and new organized crime groups in the drug trade has become a concern for policy makers in the twenty-first century (Lyman, 2013).

While the extent of the medicinal value of marijuana may be disputed, there is considerable evidence of beneficial effects, including stimulation of hunger, suppression of nausea and vomiting,

lowered eye pressure and pain relief. With new ways to consume marijuana and a growing number of dispensaries, Murphy et al. (2015) explored baby boomers' use of alternative cannabis products and the motives behind their choices. A key factor in examining practices and motives is to understand the drug itself. Cannabinoids are chemical compounds in the marijuana plant that attach to receptors in the brain, producing psychoactive effects and medicinal benefits. Currently over 80 cannabinoids have been isolated from the plant, with varying effects (Murphy et al., 2015). The two most prominent cannabinoids CBD and THC are the more recognizable and as the primary psychoactive compound, THC is responsible for producing the euphoric high familiar to most users (Murphy et al., 2015). THC also has therapeutic uses such as appetite stimulation, treatment of nausea and pain relief. THC can also cause sedation, anxiety and short-term memory impairment. CBD has anti-inflammatory, anti-epileptic, anti-psychotic and anti-degenerative properties. CBD is non-psychoactive and may inhibit some of the psychoactive effects of THC. The combination of cannabinoids has the potential clinical efficacy while reducing adverse events. Finally, Murphy et al., (2015) assert that significant increases in potency have occurred over time, and the US Drug Enforcement Administration (DEA) 2013 estimates indicate that the average THC potency of marijuana samples increased from 8.7% in 2007 to 11.9% in 2011 (Murphy et al., 2015).

Of the multitude of marijuana strains available today, the majority are derived from only two species: *cannabis sativa* and *cannabis indica*. *Cannabis sativa* strains contain high levels of THC and low or no CDB levels, which typically results in feelings of well-being, heightened senses, and increased creativity, often preferred for daytime use (Murphy et al., 2015). *Cannabis indica* strains contain a more balanced mix of cannabinoids and are usually characterized by a duller effect on the body, typically used in the evening for relaxation, stress relief, pain relief, and insomnia (Murphy et al., 2015). The researchers found that baby boomers understood the differences in the strains and had their preferences, but more importantly, they found that boomers were more concerned with harm

reduction and therefore more open to replacing or supplementing marijuana smoking (Murphy et al., 2015). Interestingly, the participants who reported that edible cannabis was their primary delivery system cited convenience and privacy as their motives. Aging may change those motives and influence choices of cannabis delivery systems. They conclude that as baby boomers age, their health concerns will grow and it is essential to overall health to evaluate and reduce the potential risks of traditional marijuana smoking (Murphy et al., 2015).

Demographics of medical marijuana users

In a large population-based study, O'Connell and Bou-Matar (2007) examined the demographic profiles, social characteristics, and patterns of cannabis and other drug use of 4,117 Californians seeking medical marijuana. All applicants were seeking physician's approval of their use of cannabis. An overwhelming majority of applicants (87.9%) disclosed that their initiation of cannabis occurred before the age of 19, usually with siblings, cousins, or peers. Applicants revealed that the amount consumed generally remained stable over time with 70% estimating they consumed up to 1/4 ounce per week and almost 90% disclosed daily or near daily use. The mode of cannabis use indicated a preference for inhalation with only 6% using edibles on a regular basis. The reasons given were that effects from edibles were more difficult to control and were either undesirable or prolonged.

The applicants suggested that they had been motivated to use cannabis by a combination of various physical and emotional symptoms, experienced at different times in their lives. Mainly used as relief from emotional symptoms, cannabis was discovered by chronic users to relieve physical symptoms as well (O'Connell and Bou-Matar, 2007). One of their most significant patterns revealed by comparing average initiation ages for cannabis, alcohol and tobacco within the context of birth cohorts was that the oldest baby boomers had tried cannabis at a considerably later age than the younger boomers (O'Connell and Bou-Matar, 2007). They also suggest that over half of American adolescents were

experimenting with marijuana at about the same average age that they were also trying alcohol and tobacco (O'Connell and Bou-Matar, 2007). When participants compared their current alcohol use with their lifetime peak, the largest percentage (87%) claimed to be drinking less than half as much. Perhaps not surprising, 96.4% of applicants claimed to have tried tobacco and 65.8% had become daily smokers for some length of time. More than 85% of the applicants had tried other illicit drugs, although the majority of those doing so had not remained chronic users of anything with the exception of cannabis. This group's alcohol consumption diminished both collectively and individually after they established cannabis as their drug of choice (O'Connell & Bou-Matar, 2007). They note that most marijuana users studied in the 1970s were adolescents and young adults who first tried alcohol, tobacco, and marijuana before later trying heroin; however, subsequent efforts to establish a definitive causal link between marijuana and harder drugs have been largely unsuccessful. They concluded that perhaps a hidden population of marijuana users exist with a somewhat unexpected profile.

Black & Joseph tested hypotheses based on social learning theory to explain marijuana use among adults aged 50-64 while considering racial and gender group differences (2014). They used three theories of social deviance (rational choice and strain theory in addition to social learning) which had previously been widely used to explain deviance and drug use. The data for this study were taken from a subset of 1,695 subjects aged 50-64, from the 2010 NSDUH, and is not representative of the general population as it was modified to include only those who reported ever having used marijuana. It is important to note that the focus of their study was a comparison of the factors associated with status group reasons for using marijuana later in life rather than having or not having used it at all. Independent variables included the number of mental health issues, the number of chronic and/or acute illnesses, whether the perceived benefits of marijuana use outweigh the risks, and norms favorable to marijuana use. Black & Joseph suggest that older adults may be turning to medical marijuana as a way to cope with mental and physical problems that occur as a result of aging (2014).

The social learning theory suggests that baby boomers hold norms and attitudes that support marijuana use, suggesting the liberal social and political views they acquired as young adults have been significantly associated with midlife marijuana use. This was the variable with the strongest effect except for minority females, for which it had no significant effect. It appears to play the greatest role for minority and non-minority males.

The rational choice theory - the principle that individuals always make logical decisions -- is the model that predicts baby boomers are getting high in record numbers because they perceive marijuana use to be a low-risk endeavor with a significant pleasure reward. This variable was significantly associated with midlife marijuana use and stronger for the minority male subpopulation with minority females showing the weakest association. The strain theory -- a model developed in the early 1990s – has also been used to explain crime, deviance and general patterns of drug use. The researchers suggest that crime and deviance are just a few of many coping strategies to alleviate strain and that individuals can consider multiple coping strategies, legal and illegal, when faced with stressors (Black & Joseph, 2014). Strains include any negative event or experience that triggers an emotional response. For aging adults, this often includes physical and mental health challenges. They found that for minority males and females, the significant strain associated with marijuana use is chronic illnesses. When faced with poverty, mental illness may go undetected and untreated in aging adults. For non-minority males, the significant strain associated with marijuana use is the number of mental health issues. The cultural stigma associated with mental illness or lack of mental health care may drive this subset to opt for self-medicating. Black & Joseph conclude that improved access to basic health care and pain maintenance medications may reduce the need to self-medicate (2014).

Therapeutic Benefits

Researchers are already examining whether using medical cannabis for chronic pain changes individual patterns of opioid use. For example, Boehnke et al. (2016) study examined whether participants would self-report whether they experienced greater pain relief from cannabis. The 185 study participants who patronized a medical cannabis dispensary in Michigan between the years 2013-2015, comprised 118 males with the largest participant category of 56 to 65 years of age, which was 25% of the sample. The primary hypothesis that participants would self-report greater pain relief from cannabis could not be supported. Overall, since the initiation of medical cannabis use, patients reported significant decreases in medication side effects (including opioids) that affected their daily functioning, decreases in total number of medications taken, and improvements in quality of life. The mean number of medication classes used decreased significantly in all respondents before and after cannabis use. Reported reduction in opioid use and decreased side effects from medication significantly correlated, suggesting a potential health benefit to replacing opioids with cannabis.

Like the people in the Boehnke et al. study (2016), participants in the Lau et al. study (2015) reported significant decreases in medication side effects with medical cannabis use. Using audio recorded, in-depth interviews, researchers sought to understand older adult cannabis users' beliefs and substitution practices as part of the harm reduction framework by collecting data from 97 marijuana users in the San Francisco Bay area born between the years 1946–1964. They note that cannabis substitution can be an effective method of reducing harm known to be associated with alcohol, illicit drugs and even pharmaceutical therapy (Boehnke et al., 2016). Participants considered cannabis a safer alternative due to more manageable or less adverse side effects, although 10% reported they experienced physical or mental health problems attributed to cannabis use. Participants expressed pride in their self-control ability with cannabis, and in using a substance with a low addiction risk and zero chance for lethal overdose, including 12.4% of the sample who considered cannabis a safer

alternative and more effective than pharmaceuticals at relieving their symptoms. Participants reported using marijuana in combination with other drugs to reduce unwanted side effects and some reported that they were unwilling or unable to stop drugs completely. The researchers noted that justifying cannabis use by citing the risks of other drugs may be a technique of risk denial because the comparisons youth in particular make may be considered attempts to neutralize the stigma (Boehnke et al., 2016). The same evaluation motivated the harm reduction methods in this sample of older adults. The level of cannabis acceptance was not a major factor in substitution practices, possibly attributed to the age and location of the population sample (Boehnke et al., 2016). A few participants shared that their health care providers refused to recommend cannabis as a therapeutic treatment based upon fear of punitive action or that they simply refuted the therapeutic value of cannabis. In conclusion, substitution highlights users' self-determination, and the rights of individuals to decide which treatment or substance is most effective and least harmful (Boehnke et al., 2016).

The key to determining how state-level norms are likely to influence social norms may be in examining the rights of individuals. The purpose of the Borodovsky et al. (2016) study was to determine if the prevalence of use of alternative methods of cannabis administration varied in relation to the presence and variation in medical marijuana laws (MMLs) among states in the US. Data were collected from 2,838 participants who had used cannabis at least once in their lifetime, and took an online survey that researchers advertised through various channels marketed to the cannabis-user target audience (e.g., NORML or *High Times* magazine). Using the public dataset from the 2013 NSDUH report, they compared the final sample to a nationally representative sample of individuals who used cannabis in the past month. Cannabis users in the 2016 study were more likely to be daily cannabis users and have an earlier age of onset of cannabis use (Borodovsky et al., 2016). The prevalence of having ever used cannabis via vaping or edibles was significantly higher among respondents in MML states compared to non-MML states. A higher proportion of respondents from non-MML states preferred smoking while

persons living in MML states were less likely to prefer smoking. There were no differences in preference for vaping or edibles between those living in MML or non-MML states. Respondents from states with a higher density of dispensaries had a significantly lower likelihood of preferring smoking compared to those from non-MML states. Therefore, their findings support the hypothesis that vaping and use of edible cannabis is more prevalent in states with MMLs, in states that have had MMLs in place for a longer time, and in MML states that have a higher per capita density of cannabis dispensaries (Borodovsky et al., 2016).

Cannabis vaporization is an alternative technique for administering marijuana that avoids the production of irritating respiratory toxins by heating cannabis to a temperature where active cannabinoid vapors form but below the point of combustion where toxins are released. Wilsey et al. (2013) conducted a double blind, placebo-controlled, crossover study evaluating the analgesic efficacy of vaporized cannabis. They recruited thirty-nine patients from pain clinics at UC Davis Medical Center and Veterans Affairs of Northern California Health Care System with central and peripheral neuropathic pain, despite traditional treatment. Neuropathic pain, a disease of the peripheral or central nervous system, develops when nerves, the spinal cord or brain are injured or the sensory system no longer functions adequately (Wilsey et al., 2013). To reduce the risks of adverse psychoactive effects, previous cannabis exposure was required of all subjects. Excluded from the study were candidates who reported a history or diagnosis of serious mental illnesses (e.g. severe depression, schizophrenia and bipolar disorder).

The researchers found that both low and medium doses proved effective analgesics for the neuropathic pain conditions studied (Wilsey et al., 2013). Both dosages provided significant (30%) reductions in pain intensity when compared to the placebo. Further, cannabis is superior to the results achieved with those medications, amitriptyline and mexiletine, routinely prescribed for neuropathic pain

(Wilsey et al., 2013). Undesirable effects were observed, although these side effects were acceptable and tolerable to all participants. In general, the greatest dose effects were observed in the learning and memory area, still within the low to medium range, which is considered unlikely to have significantly effects on daily functioning (Wilsey et al., 2013). Cannabis administration that is safer, in other words, has fewer harmful effects for the patient will likely continue to draw the attention of policy makers as state legalization continues and medical professionals seek alternatives to pain management (Wilsey et al., 2013). This may be accelerated by the US FDA 2016 black box warning on opioid medications. Opioids are a class of powerful narcotic medicines used to treat severe pain for which other pain medicines are not able to provide enough pain relief. They also have serious risks including misuse and abuse, addiction, overdose, and death (US FDA, 2016).

In the Ilgen et al. (2013) study, researchers wanted to learn more about medical marijuana users by examining descriptive characteristics of adults seeking medical marijuana in a southwestern Michigan medical marijuana clinic. They compared individuals seeking marijuana for the first time with those renewing their medical marijuana card on measures of substance use, level of pain and functioning. Of the sample, 195 reported seeking medical marijuana for the first time, while 153 reported that they were seeking to renew their card (Ilgen et al., 2013).

The vast majority of participants (87%) reported they were seeking medical marijuana for pain relief, either alone or in conjunction with other reasons. The participants seeking medical marijuana for only non-pain reasons were 9.8%. Most participants (89%) reported alcohol use within their lifetime and approximately 40% of the sample reported non-medical use of opioids in their lifetime (Ilgen et al., 2013). Lifetime substance use was significantly greater among patients with a reported history of using hallucinogens, cocaine, amphetamines, inhalants and heroin who were seeking to renew their medical

marijuana card relative to first time patients, but not for patients with alcohol or non-medical use of prescription opioids (Ilgen et al., 2013).

A majority of patients (68%) responded that they used prescription opioids in a manner other than that for which it was prescribed (more than prescribed, obtained through someone else or used for reasons other than pain relief) within the last month (Ilgen et al., 2013). Patients who were visiting for the first time and returning patients did not differ on this measure. Lifetime marijuana use was common in all participants (96%) with a modestly higher percentage for returning visitors (Ilgen et al., 2013). Within the three months prior to the interview 61% reported daily or almost daily use. When rating current and average pain over the past 30 days, first time visitors reported higher current pain ratings than did returning visitors; however, average pain levels in the past 30 days were not significantly different between the groups. Compared to first time patients returning patients reported somewhat lower current pain level and slightly higher mental health and physical functioning (Ilgen et al., 2013).

Chapter Two: Marginalized Groups

In this chapter, three subgroups within the larger baby boom cohort who may be perceived as part of an invisible aging population are examined: the mentally ill, veterans, and substance abusers. Criteria for use and abuse of medicinal marijuana for various physical and psychological conditions are assessed and evaluated. The motivations within these groups may offer healthcare providers insights into treatment.

Mental Illness

The Diagnostic and Statistical Manual of Mental Disorders (DSM) published by the American Psychiatric Association (APA) offers a common language and standard criteria for the classification of mental disorders. Now in its fifth edition, the DSM is used and relied upon by clinicians, researchers, regulating agencies, health insurance companies, and policymakers (APA, 2017). The DSM contains descriptions, symptoms, and other criteria for diagnosing mental disorders. It allows clinicians to communicate about their patients and establishes consistent and reliable diagnoses that can be used in the research of mental disorders. It also enables researchers to study the criteria for potential future revisions and to aid in the development of medications and other interventions (APA, 2017).

Choi et al. (2014) analyzed data from the 2008 and 2012 NSDUH (n=96,966) specifically for age group differences in and correlates of, treatment use and perceived treatment need for substance use disorders (SUD) and mental health problems, as well as for barriers to treatment among people 65 years of age and older. The primary SUD reported was alcohol abuse at 2.95% compared to illicit drug abuse at only 0.46% of the population. The primary mental health (MH) diagnoses were major depression (6.48%), anxiety disorder (5.40%), serious psychological distress (9.21%) and serious suicidal ideation (3.26%).

Overall, 6.94% of the population had a SUD and 15.25% had a MH problem. As the researchers suspected, the 65 years of age and older group had the lowest rates of SUD (1.78%), MH problems (8.58%), and comorbid SUD and MH problems (0.33%) of all age groups, while the 26-34 years of age group had the highest rates in all categories (Choi et al. 2014). The 65 years of age and older group had the lowest rates for perceived need for treatment; however, alcohol and drug dependence comorbidity increased the odds of perceived need. For older adults with SUD, Choi et al. cited the lack of readiness to stop using as the most frequently reported barrier to treatment use (2014). For MH treatment, older adults most frequently reported treatment cost as a barrier, although they were less likely than younger adults to report cost as a barrier, perhaps due to Medicare coverage. This suggests that the impact of mental health-related stigma on treatment-seeking exists but the data do not provide information on why people fail to perceive the need for treatment (Choi et al. 2014). There are policy implications, as older adults were less likely to report cost and stigma/confidentiality concerns as treatment barriers than younger adults; healthcare providers might focus older adults on understanding the benefits of treatment and the negative effects that can occur from substance abuse due to metabolic and other physiological changes that occur with aging (Choi et al. 2014). They conclude that mental health services will need to be expanded in the near future as this group is quickly becoming a larger portion of the total US population with SUD and MH problems (Choi et al. 2014).

Patterns of alcohol and drug use among depressed older adults was the focus of the Satre et al. (2011) study. The study examined the prevalence of alcohol and drug use among 154 older adults aged 60 years and older diagnosed with depression and seeking outpatient psychiatric care. Recent alcohol and drug use and a history of alcohol-related problems were common. The study results indicate that alcohol and drug use in the prior month, particularly cannabis use and misuse of sedatives, was prevalent in this sample (Satre et al., 2011). The rates of recent alcohol use in their sample was higher than those found in community samples and they attribute this in part to the selection of a sample

drawn from a well-educated, urban population which tends to have greater alcohol use (Satre et al., 2011). Patients reporting any cannabis use were frequent users with a significant association between depression severity and cannabis use, even after controlling for age, gender and health status. Some patients using cannabis to help manage depression may be exacerbating it with cannabis use and anxiety may further complicate management (Satre et al., 2011).

The evidence of this study suggests that past cannabis use does not significantly predict onset of depression among adults, although there has been no research in adults over 60 years of age (Satre et al., 2011). Satre et al. suggest that future studies should investigate this; with the number of older adults using cannabis expected to rise dramatically, it will be important to measure the extent to which they use cannabis to treat depression, anxiety, and chronic pain (2011). They note that patients seeking specialty psychiatric services have sociodemographic differences compared with patients treated in primary care, including higher income, history of suicidality, and better physical health (Satre et al., 2011).

In another study, Shibusawa & Padgett (2007) conducted a case study with 25 individuals from New York, aged 40-62 years, diagnosed with a mental illness who were currently or had previously been homeless. They considered age 40 and above to be "mid-life to older" adults because of the shorter lifespan of individuals who have been homeless (Shibusawa & Padgett, 2007). The primary psychiatric diagnoses were schizophrenia (44%), major depression (32%) and bi-polar disorder (16%). The number of individuals living with severe mental illness in mid-life and old age is projected to increase dramatically (Shibusawa & Padgett, 2007). There were 4 million people over the age of 65 who had a mental illness in 1970, and projections have this number skyrocketing 275% to 15 million by 2030 (Jeste et al., 1999). Researchers argue that decreased mortality rates among younger adults with psychiatric disorders will result in a larger proportion of older adults with schizophrenia, depression and substance

abuse (Shibusawa & Padgett, 2007). Moreover, substance abuse can have devastating consequences for those who struggle with severe mental illness including relapse, symptom exacerbation, poor treatment compliance and suicide risk. Jeste et al. (1999) also noted that compared to earlier cohorts the baby boomer generation would experience higher rates of depression, anxiety disorders and substance abuse. The majority of the sample (72%) had a long history of substance abuse, and 15 of the 18 who had a history of substance abuse had used alcohol and/or illicit drug use preceding entry into psychiatric treatment and seven reported still using alcohol and illicit drugs (Shibusawa & Padgett, 2007). They conclude that participants may downplay the effects of mental illness and substance abuse due to fears of stigma and a desire to normalize their past (Shibusawa & Padgett, 2007). The participants in this study represent a group of underserved and hard to reach mid-life and older adults who struggle with lifelong adversities. Shibusawa & Padgett conclude that further research is necessary to develop an understanding of these vulnerable adults who live on the fringes of society (2007).

Veterans

War takes a physical and emotional toll on service members (Appendix A). In 1980, the APA added Post-Traumatic Stress Disorder (PTSD) to the DSM-III, which stemmed from research involving returning Vietnam War Veterans, Holocaust survivors, sexual trauma victims, and others. Research about veterans returning from combat was a critical piece in the creation of the diagnosis. Links between the trauma of war and post-military civilian life were established as persistent severe PTSD symptoms were associated with deteriorating familial relationships, decreased life satisfaction and happiness, increased mental health service use, and increased nonspecific health complaints (Friedman, 2016). Many veterans returning from war develop PTSD, an often debilitating illness with severe symptoms such as sleep disturbances and hyper-arousal. The latest edition of the DSM places PTSD in a new category, Trauma- and Stressor-Related Disorders. PTSD includes four different types of symptoms: reliving the traumatic event (also called re-experiencing or intrusion); avoiding situations that are

reminders of the event; negative changes in beliefs and feelings; and feeling keyed up (also called hyper-arousal or over-reactive to situations). Most people experience some of these symptoms after a traumatic event, so PTSD is not diagnosed unless all four types of symptoms last for at least a month and cause significant distress or problems with day-to-day functioning (APA, 2017).

Some veterans may be using cannabis as a coping method to mitigate the severity of these symptoms. The purpose of the Johnson et al. (2015) study was to better understand the association between cannabis use and PTSD symptoms. One theory regarding the association relates to the perceived therapeutic benefits of cannabis. Participants in this study were enrolled in the VA primary care mental health integration program, based on clinical referrals following diagnoses of depression, PTSD, or alcohol use. Of the 350 veterans examined, 30% were daily cannabis users, and 20% were weekly users. The researchers' results did not support their hypothesis that cannabis use among veterans with probable PTSD would be associated with less severe PTSD symptoms and that symptomology was not associated with frequency of use (Johnson et al., 2015). They acknowledge that it is possible that veterans using cannabis could actually be better than they were prior to the use of cannabis. If cannabis were to have therapeutic effects, Johnson et al. would have expected to see less severe symptoms compared to the controlled group, and that frequency of use would then be associated with less severe symptoms (2015).

Researchers in the Beristianos et al. (2016) study wanted to determine if PTSD is associated with cardiovascular disease among aging veterans and whether the association is independent of medical and psychiatric comorbidities. They studied over 138,000 veterans, aged 55 and above without a history of cardiovascular disease which has been consistently associated with PTSD. Specifically, the cardiovascular outcomes that have been examined in veterans and POW's include congestive heart failure (CHF), myocardial infarction (MI), and cerebrovascular disease (CVD) (Beristianos et al., 2016).

The majority of veterans with comorbidities and PTSD had a significantly higher prevalence of medical, psychiatric, and substance use disorders than veterans without PTSD (Appendix B). Individuals with PTSD have more problems with tobacco cessation, are less physically active and have an increased risk for obesity. The researchers suggest that since PTSD is prevalent throughout the lifespan it will be critical to understand the impact late-life PTSD has in the aging population, as PTSD in late life has been shown to be associated with cognitive impairment and an increased risk for developing dementia (Beristianos et al., 2016). They conclude that, with such a dramatic rise in the aging population and higher numbers of veterans of more recent conflicts reaching old age, early diagnosis and successful treatment of PTSD will be essential to improve the health outcomes of older adults (Beristianos et al., 2016).

The relationship between marijuana use and coronary heart disease, including prognosis among patients with coronary heart disease, was the focus of an early study by Mukamal et al. (2008). They conducted a cohort study of 1,913 adults hospitalized with myocardial infarction at 45 hospitals across the U.S. With a follow-up mean of 3.8 years, they established total mortality according to self-reported marijuana use in the preceding year. Three-quarters of marijuana users were cigarette smokers, as well. In addition, 68% of the sample had hypertension and 29% had diabetes. It is important to note that the focus of this study is an examination of the factors associated with coronary heart disease and marijuana use, and mortality rather than comorbidities (Mukamal et al, 2008).

Marijuana use has non-cardiovascular effects, including potential adverse respiratory, neurological, and immunological effects, which on vulnerable patients such as those with coronary heart disease had not been studied (Mukamal et al, 2008). In total, 52 patients (2.7%) reported marijuana use in the preceding year. The marijuana users were reported to be younger than other patients, to engage in heavier than usual alcohol consumption (which is not supported in other studies here), and were

more likely to be male, current smokers (77%) and divorced. During the follow-up period, 317 patients died and only 7 of those patients reported marijuana use (Mukamal et al., 2008). To determine whether marijuana use was associated with a gradient risk of death, Mukamal et al. separated marijuana users into those reporting less than weekly use and those reporting weekly use or more. The hazard ratio nearly doubled from 2.5% to 4.2% for weekly or more users. They repeated this analysis with the current smokers, who accounted for 62 of the deaths. They found marijuana use as measured at the time of hospitalization was associated with mortality 3 times higher after infarction (Mukamal et al, 2008). The highest risk of death was among individuals who used marijuana most frequently. Some of the effects marijuana can induce are increased resting heart rate, increased blood pressure, postural dizziness and syncope (Mukamal et al, 2008). Marijuana increases heart rate and therefore, myocardial oxygen demand, and may limit oxygen uptake with simultaneous carbon monoxide exposure. They noted that while marijuana use increases risk-taking behavior in some settings, it was less strongly associated with risk-taking in this relatively older aged cohort (Mukamal et al, 2008). They did not collect data on marijuana use post-MI and acknowledge that they may have underestimated the true effect of post-MI marijuana use on survival. A cause and effect relationship was not established (Mukamal et al, 2008).

The frequency of medical cannabis use among those with PTSD was examined in the Bonn-Miller et al. (2013) study. Evaluating 170 patients from a CA medical marijuana dispensary to determine frequency of cannabis use, alcohol use, and specific coping use motivations, the researchers wanted to know if individuals with PTSD use cannabis specifically to improve sleep or to cope with the broader spectrum of PTSD symptoms. They examined patterns to determine the specific motives that distinguish a medicinal-cannabis using individual with PTSD from a non-user and whether these motives are associated with more severe use frequency (Bonn-Miller et al., 2013). Consistent with their hypothesis, they provided the first evidence for cannabis use for sleep disturbances among those with probable PTSD, with coping and sleep being the only two motives observed to differ between those with

PTSD and those without (Bonn-Miller et al., 2013). Also consistent with their hypothesis was that those with probable PTSD who used cannabis to improve sleep reported more frequent cannabis use (Bonn-Miller et al., 2013).

Because little information is available regarding PTSD among medical cannabis patients, Bohnert et al. (2014) sought to provide initial data on this topic by examining the prevalence of positive PTSD screens from a sample of patients (n=195) seeking medical cannabis certification for the first time. Of the states having passed legislation for cannabis use for qualifying medical conditions only a minority include PTSD as a qualifying condition (Bohnert et al., 2014). Qualifying conditions vary but most include cancers, HIV/AIDS, severe and chronic pain and multiple sclerosis. Nearly all of the participants in this study had a lifetime history of alcohol and cannabis use; however, there were significant differences between the group with positive PTSD screens and the negative PTSD screens (Bohnert et al., 2014). The group with positive PTSD screens had significantly higher percentages for prescription opioids, prescription sedatives, cocaine and street opioid use. Additional research is necessary to examine the course of PTSD symptoms over time with medical cannabis users and to understand the extent to how PTSD symptoms may change when using medical cannabis (Bohnert et al., 2014).

The Boden et al. (2013) study was the first to explore links between PTSD and cannabis use characteristics among veterans (n=94) immediately prior to a cannabis quit attempt, including motives, problems, and withdrawal. Cannabis use characteristics and symptom severity were measured as increased substance abuse may be linked to exposure to trauma as individuals attempt to alleviate related PTSD symptoms (Boden et al., 2013). The most commonly cited symptoms include insomnia, anxiety, stress and depression. They found that when compared to participants without PTSD, those with PTSD had increased a) use of cannabis to cope; b) severity of cannabis withdrawal; and c) craving (Boden et al., 2013). Boden et al. discovered that cannabis users attempting to quit experienced

withdrawal symptoms such as irritability, chills, and anxiety and established that PTSD severity was positively associated with using cannabis to cope, cannabis use problems and severity of withdrawal (2013).

The association between substance abuse disorders (SUDs) and mortality among veteran with PTSD was examined in a study by Bohnert et al. (2013). Bohnert et al. asserts that while SUDs have been associated with mortality among veterans with psychiatric disorders, it is unknown whether having a SUD increases the risk of death among veterans with PTSD and whether the association varies by age cohort (2013). The large sample (n=272,509) comprising veterans who received VHA services and were diagnosed with PTSD, were followed for a two-year period (2005-2007) for the main outcomes of mortality and cause of death. In the PTSD cohort, having a SUD significantly increased the risk of all causes of mortality (Bohnert et al., 2013). Separating the sample by age 45-64 and 65 years and older, the study tested whether having a SUD was more predictive of injury-related mortality than non-injury-related death. Roughly 20% of the sample were smokers and approximately half of the others had at least one other medical comorbidity (Bohnert et al., 2013). They found that for the older age group, which includes Vietnam veterans, the results confirmed that having a SUD might contribute to the risk of mortality among psychiatric patients, which may be useful for identifying PTSD patients with an increased risk of death (Bohnert et al., 2013).

Tull et al. (2016) explored the effect of PTSD on trauma cue reactivity in substance dependent patients (n=202). The first study of its kind, the purpose was to look at how marijuana use may affect in-the-moment emotional response among individuals with PTSD, as the symptoms of PTSD have the potential to result in broader functional impairment and contribute to the possible development of other psychiatric disorders (Tull et al., 2016). Tull et al. asserts that no studies to date have explored the way in which marijuana may affect in-the-moment emotional response among individuals with PTSD

(2016). For example, it is possible than someone with PTSD may exhibit more intense emotional responses to a trauma cue in the context of marijuana use. Therefore, marijuana use may exacerbate the heightened emotion dysregulation found in PTSD (Tull et al., 2016).

Results showed current PTSD was associated with greater emotional reactivity only among participants without marijuana dependence, and marijuana dependent participants (with and without PTSD) reported less emotional reactivity than participants with PTSD but without marijuana dependence (Tull et al., 2016). There were no differences in the severity of PTSD symptoms between participants with and without marijuana dependence and suggest that participants with co-occurring PTSD and marijuana dependence may exhibit a dampened response to trauma cues (Tull et al., 2016). Tull et al. concludes that further research is necessary to isolate the specific mechanisms thru which marijuana use influences emotional reactivity (2016).

Mental health service utilization among nearly 97,000 older veterans recently diagnosed with PTSD was examined in a study by Smith et al. (2015). In this sample there was a range of psychiatric comorbidities such as depression (31%), anxiety (14.9%) and major affective disorder (12.7%). Smith et al. determined that baby boomers are coming forward with new PTSD diagnoses yet the increasing age of older veterans with newer diagnoses was associated with decreased odds of obtaining mental health treatment (2015). Among veterans receiving mental health treatment, increased age was also associated with decreased odds of psychotherapy and pharmacotherapy, a decreased number of psychotherapy visits and longer wait times. Psychiatric comorbidities and a greater number of medical appointments increased the odds of veterans receiving treatment. It remains unclear what accounts for these new PTSD diagnoses although younger veterans coming forward may be a catalyst (Smith et al., 2015). For some individuals, PTSD symptoms appear to fluctuate over time, peaking immediately following trauma and steadily declining sometimes over decades only to reappear in retirement (Smith

et al., 2015). They note that although older individuals are at a decreased risk for developing PTSD, there are unique considerations for this population as they likely have psychiatric comorbidities, higher likelihood of disability, and a decreased quality of life (Smith et al., 2015).

Substance Abuse

Studies of drug use in representative population-based samples are rare. Blazer and colleagues (2009) used data from the National Survey of Drug Use and Health (NSDUH), an annual survey on substance abuse and health status to examine over 10,000 subjects age 50 years and older. While nearly 60% of the population used alcohol in the past year only 2.6% used marijuana and 0.41% used cocaine. Marijuana use was near 4% in the 50-64 age group but much lower (0.7%) in the 65+ age group. Of the respondents who used drugs in the past year, 15% had used two or more drugs. Those who had used alcohol or a drug in the past year did so on more than 30 days (49% of marijuana users and 57% of cocaine users). The use of marijuana and cocaine was more prevalent in the 50-64 age group and in men. In contrast with alcohol use, drug use was not associated with level of education and was more common in the non-married group.

In contrast to the youthful cohort studied in the Harper et al. (2012) study, Colliver et al. (2006) wanted to project drug use among baby boomers in 2020. They suggested that the size of this cohort and greater rates of lifetime drug use by this generation would result in the increase of elderly drug users (Colliver et al., 2006). Like the Blazer, et al. (2009) study, they used multi-year data collected from the National Household Surveys on Drug Abuse (NHSDA), known since 2002 as the NSDUH. Drug use measures consisted of age at first use, past year use, and lifetime use. Two predominant types of illicit drug use emerged in the older adult population: marijuana and non-medical use of prescription psychotherapeutic drugs (stimulants, analgesics, sedatives and tranquilizers) (Colliver et al., 2006). They sought to project the use of marijuana and non-prescription drugs independently. The measure of

prescription drug misuse was defined as a situation in which the respondent did not have a prescription for a medication or was taking it purely for the feeling or experience (Colliver et al., 2006). Initiation of marijuana use before age 16 increased the odds of current marijuana use by a factor of 2.93.

The overall number of illicit drug users is projected to increase from 1.6 million in 2001 to 3.5 million by 2020, an increase of 113% based upon the increase in population (52%) and increase in rate of use (41%) (Colliver et al., 2006). Changes in age distribution are expected when the proportion of the population in their 50's decline, whereas the proportion of persons in their 60's is expected to increase from 14% to 37% (Colliver et al., 2006). The overall number of marijuana users is forecast to increase from 719,000 (1% of the population in that age group) to 3.3 million (2.9%). Projections of the number of users by 2020 particularly of marijuana have wide confidence levels. They suggested that the key to understanding the impact of potential increases in drug use in older adults is in the research on the effects of illicit drugs on the aging brain (Colliver et al., 2006). Metabolism and drug sensitivity in older adults may result in intoxication and residual effects, affecting cognitive and motor functioning necessary for daily life (Colliver et al., 2006).

In order to provide greater insight to health care providers and to enable them to better care for this population, DiNitto & Choi (2011) sought to determine the correlates and patterns of marijuana use among older adults. The purpose of their study was threefold. First, they wanted to test whether variables associated with health and substance abuse and mental health treatment correlated with older adults' use of marijuana. Second, they wanted to determine if past-year users experience problems that the other two groups of users do not, problems that may require identification and intervention. Finally, they wanted to know more about the patterns of marijuana use among past-year users to provide additional information that might help in screening and intervention (DiNitto & Choi, 2011). The sample obtained from the 2008 National Survey on Drug Use and Health (NSDUH) consisted

of 5,325 adults aged 50 and over, with the age group of the sample split into two subsets: 50-64 years and 65 years and over. Nearly 31% of the US population was aged 50 years or older in 2008. Respondents identified as never having used marijuana (never users), those who had used marijuana but not in the past 12 months (non-recent users), and those who had used marijuana within the preceding 12 months (past-year users) (DiNitto & Choi, 2011).

Past-year users were surveyed on the number of days they used, how they obtained the marijuana they most recently used, and if purchased, the seller, location purchased, and the price. Those who used on five or more days were also asked whether they tried to reduce or stop their use and whether they had any of the following problems associated with marijuana use: emotional or physical problems, lower activity level, dangerous activity, problems at home/work, conflict with family/friends, or problems with the law (DiNitto & Choi, 2011). They measured psychological distress by reporting on the frequency of symptoms such as nervousness and depression to feelings such as a lack of self-worth.

Their results showed that 68.7% reported never using marijuana, 28.5% used it more than 12 months prior and 2.8% used marijuana in the last 12 months (DiNitto & Choi, 2011). The past-year users group reported significantly higher psychological distress that the non-recent users and the never-users. Compared to the same two groups, a higher proportion of past-year users also reported that they consumed alcohol beverages, smoked cigarettes or used other tobacco products, and used other illicit drugs in the past 12 months.

Several patterns emerged (DiNitto & Choi, 2011). Almost a quarter of the people (24%) used marijuana 1 to 5 times during the past 12 months and about the same (23%) used it on more than 180 days. Nearly half of the past-year users purchased the marijuana they used recently, mostly purchased from or shared among friends (DiNitto & Choi, 2011). Most who bought it purchased it a private home or an outside location in their neighborhood. Nine percent of past-year users reported emotional and

physical problems, low activity, engaging in dangerous activity, serious problems at home/work, or conflict with family/friends over their marijuana use (DiNitto & Choi, 2011). Almost 55% of past-year users had not tried to cut down and did not want to cut down. Marijuana use found in 50-64 years old subset of older adults was most predominant and almost two-thirds of the past-year users initiated use before or at age 18, and another 27% by the age of 29 years. Nearly a quarter of the past-year users used marijuana on 180 or more days of the year, suggesting that marijuana use was part of their routine lifestyle choices (DiNitto & Choi, 2011).

From a societal perspective, dramatic shifts have occurred in patient characteristics of those currently admitted to substance abuse treatment facilities. Researchers in the Duncan et al. (2010) study examined admissions of 918,955 persons 55 years and over from the Treatment Episode Data Set (TEDS), an administrative data system which provides descriptive information about the national flow of admissions to substance abuse treatment providers. TEDS is part of the Drug and Alcohol Services Information System, designed to provide data on the number and characteristics of admissions to programs that receive state and/or drug agency funds for the provision of treatment services. Of this sample, 80.4% were male and 25.4% were veterans (Duncan et al., 2010).

During the years 1992-2006, the proportion of admissions for alcohol abuse declined from 81.7% to 51.6%. Individuals admitted for "other drug use" climbed from 10.3% in 1992 to 32.5% in 2006 for those aged 55 years and over (Duncan et al., 2010). The researchers note the "non-alcohol admits" category includes both illicit drugs and prescription drugs. Looking at six commonly used illicit drugs (marijuana, cocaine, heroin, phencyclidine, hallucinogens, and methamphetamines), they identified an increasing pattern of illicit drug use reported at admission (Duncan et al., 2010). This is representative of only a portion of the total illicit use among this population as an unknown variable includes how many people reporting opiates were using illicit opiates or prescribed opiates (Duncan et al., 2010). They

assert that the TEDS data forecasts a wave of older addicts whose primary problem is not alcohol and they attribute this wave primarily to the continuing emergence of the baby boomer generation (Duncan et al., 2010). They conclude that the question will become, "What to do with the baby boomer who enters treatment?"

Retirement could be one catalyst for substance abuse/addiction. This is the phase when aging adults, sometimes empty nesters, definitely have more free time and fewer obligations. The association between retirement and drug abuse as well as the possible conditioning effects of age and retirement trajectory was examined in the Bacharach et al. (2008) study. Data were collected from 978 retirement-eligible employees from nine unions representing three blue-collar employment sectors (construction, manufacturing and transportation). With a response rate of 35%, 661 respondents with possible abuse of drugs other than alcohol within the past 12 months were included, using the DAST-10 screening tool to assess drug abuse severity. Employment status of respondents was assessed on three categories: a) eligible for retirement benefits, but did not retire, b) retired with benefits, but then engaged in part-time or full-time bridge employment, or c) took retirement benefits and withdrew from the workforce entirely. They found that 26% of the respondents reported having at least one problem related to drug abuse (Bacharach et al., 2008). First, Bacharach et al. found that older adults are not immune to drug abuse. Second, they found that being fully retired as opposed to deferring retirement (at least four years after retirement eligibility) is associated with increased abuse severity (2008). They concluded that age was inversely related to drug abuse severity for those fully retired, with younger retirees reporting more abuse-related problems than older retirees (Bacharach et al., 2008). For those who deferred retirement and stayed on with their primary employer the relationship reversed. Hence, younger, retirement-eligible workers who defer retirement report fewer drug-related problems than reported by their older peers (Bacharach et al., 2008).

It seems important to examine how marijuana correlates with use of other illicit drugs in a pain patient population. The objective of the Pesce, et al. (2010) study was to determine whether marijuana-using chronic pain patients have a higher incidence of cocaine and methamphetamine use. They obtained and tested urine samples of 21, 746 chronic pain patients currently receiving treatment with opioids. They found a 13% incidence of patients positive for tetrahydrocannabinol THCA, 4.6% positive for cocaine, and 1.07% positive for methamphetamine (Pesce, et al., 2010). Of all patients using marijuana, 86% were not using cocaine or methamphetamines. Use of cocaine and methamphetamines can have powerful negative effects including anxiety, confusion and insomnia, and long-term use can affect the central nervous system, heart, liver and brain (Pesce, et al., 2010). While they have no data as to the causal relationship of this type of drug use, Pesce et al. determined that there was a correlation between marijuana use and other illicit drug use; therefore, physicians should be aware of a greater risk to marijuana-using patients (2010). Patients using illicit drugs in combination with prescription opioids are at risk for reactions from the illicit drugs as well as drug-drug interactions. They suggest drug testing as an essential component of the care of patients using opioid therapy (Pesce, et al., 2010). While patients may be more likely to report using marijuana over the harder drugs, they risk possible denial of coverage for health insurance; therefore, physicians may be less likely to test for it (Pesce, et al., 2010). Patients may also be diverting some of the prescribed opioid medication to pay for the illicit drugs. Pesce et al. conclude that physicians should be aware of their patients' usage due to potential health risks, compliance, and to determine if they are at risk for diversion and use of illicit drugs (2010).

Also using TEDS data from 1992–2005, Lofwall et al. (2008) examined increasing drug abuse treatment admissions as well as the number and specific types of substances abused, and the characteristics of older aged admissions (i.e., alcohol-only, drug-only, or combined alcohol-drug abuse). The population was divided into two subsets: 50-54 years of age, and 55 years and older, and they noted that while age 50 is not chronologically old, it is reasonable to consider it old because people with a drug

dependence problem die on average 22.5 years earlier than those without the diagnosis (Neumark et al. 2000). The six most common reasons for admission in every year for both older age groups were alcohol, heroin, cocaine, prescription opioids, marijuana, and methamphetamines. Alcohol continues to be the number one reason for admissions although it declined significantly (>20%) over the period (Lofwall, et al., 2008). The percentage of admissions for alcohol abuse was highest among those age 55 years and older whereas the percentage of admissions for illicit drugs was consistently lowest in this age group. Admissions for all illicit drugs increased each year within both older age groups with the exception of admissions for cocaine, which decreased significantly. Specifically, marijuana abuse reported by 0.8% in the 50-54 years old group and 0.5% in the 55 years and older group in 1992, increased to 3.0% in the 50-54 years old group and 2.0% in the 55 years and older group. They argued that one of their most important findings based upon these data was that older people abuse illicit drugs, rather than age out of using illicit drugs (Lofwall, et al., 2008). This suggests, in part, that this is due to a cohort effect because more baby boomers have aged into these two older age categories. Further, aging is not always protective against drug use but rather that drug addiction includes many factors (Lofwall, et al., 2008).

The Nunberg et al. (2011) study provides descriptive information on 1,655 applicants in California who sought a physician's recommendation for medical marijuana, the conditions for which they sought treatment, and the physician's diagnoses. The data was collected during an analysis of physician records and questionnaires distributed over a three-month period at nine medical marijuana specialty practices operating across the state. The 25-34 years of age group was the highest, seeking a recommendation at 27.9% although 32.3% of the sample were over the age of 45 (Nunberg et al., 2011). Of these individuals 82.6% of applicants reported that they most frequently reported using medical marijuana for pain relief, improved sleep (70.6%), relaxation (55.6%), muscle spasms (41.3%), headaches (40.8%), anxiety (38.1%), improved appetite (38%), nausea and vomiting relief (27.7%) and depression

relief (26.1%). More than half (50.8%) of the population reported using marijuana as a substitute for prescription medications and 13.2% reported using it as a substitute for alcohol (Nunberg et al., 2011).

Chronic pain disorders were the most common diagnoses made by physicians with 58.2% of applicants diagnosed with a musculoskeletal or neuropathic chronic pain condition. Low back pain was diagnosed for over a quarter (26.2%) of patients seen during this time with lumbar and cervical degenerative disc disease (21.8%) and arthritis (18%), the next most common diagnoses in the chronic pain group. Mental health disorders were the next largest group of diagnoses made with 22.9%, followed by sleep disorders at 21.3%, while only 3% of the applicants diagnosed with either cancer or HIV/AIDS. Physicians determined that almost half of all applicants (48%) experiencing chronic pain either currently or in the past had been prescribed opioids or opiate medication (Nunberg et al., 2011). Non-prescription therapies tried by applicants seeking a medical marijuana recommendation included physical therapy, chiropractic services, surgery, psychological counseling and acupuncture. Therefore, the data suggests that applicants sought other strategies to manage their symptoms prior to seeking this recommendation (Nunberg et al., 2011). They suggest that future research should focus on whether marijuana eliminates or reduces the need for prescription medications and if cost savings and/or improvements to quality of life correlated with substituting certain prescription medications with marijuana (Nunberg et al., 2011).

The Miech & Koester (2012) study was the first age-period-cohort analysis of past year marijuana use that included adult trends from 2001-2009, also the first to examine possible differences across race/ethnicity in age-period-cohort marijuana trends. They assert that historical trends in any outcome are a function of birth cohort, historical period, and age influences. The fact that many outcomes vary substantially by age is complicated by separating historical period and cohort effects (Miech & Koester, 2012). In this case, past-year marijuana prevalence declined substantially with

advancing age. An age-period-cohort analysis provides separate estimates for these three influences independent of each other. An independent, positive influence of cohort on past-year marijuana use, net of historical period and age effects, was uniquely high for the baby boom cohort, and declined for later cohorts, particularly for men (Miech & Koester, 2012). More broadly, historical period effects of the analysis revealed that from 1984 to 2000, past-year marijuana use declined for all cohorts among men, and appeared to increase among women. The prevalence of marijuana use declined with advancing age. The researchers found that the most recent birth cohorts do not show favorability for marijuana use (Miech & Koester, 2012). The influence of cohort on past-year marijuana use indicates the extent to which a birth cohort has a prevalence of use not explained by historical period or age effects. This effect is smaller for the younger cohorts and has been in steady decline since the 1955-1959 birth cohort (Miech & Koester, 2012).

Growing evidence suggests historical period influences for marijuana trends has important consequences for the normalization hypothesis noted in earlier research (Measham & Shiner, 2009; Parker, 2005). This hypothesis is based on the premise that the growing prevalence of marijuana use over historical time stems from a cohort process that self-medicates both success and failures in modern times, thereby they continue to use as they age. The results of this study did not support that, suggesting an opportunity to examine historical period processes in addition to cohort processes and if normalization exists in all age groups (Miech & Koester, 2012). This study suggests social norms such as perceived harmfulness and disapproval of marijuana as the strongest drivers of observed trends (Miech & Koester, 2012).

In this group the baby boomer cohort does not have the highest prevalence of past-year use in comparison with other cohorts, and the prevalence of past-year use did not increase form 2001-2009 as it did for all other racial/ethnic groups; interestingly, the researchers attribute this to higher migration

rates for Hispanics (Miech & Koester, 2012). For example, among adults in 2000 who were on baby boom age, only 37% of Hispanics were born in the US or to a US parent abroad, as compared to 96% of non-Hispanic whites and 91% of non-Hispanic blacks. Finally, they suggest that many of the Hispanics baby boomers in the US today did not grow up in the US social environment that led to the unique drug behaviors of baby boomers, and therefore shaped in their countries of origin (Miech & Koester, 2012).

As in previous studies presented here, researchers in the Reinarman et al. (2011) study examined population characteristics on a sample of 1,746 patients from nine California assessment clinics. They evaluated standardized medical history forms and physician's evaluations to describe patient characteristics, patient symptoms, other treatments and drug use, and medical marijuana use practices. The 25-34 years of age group was the highest seeking a recommendation at 27.5%, although 33% of the patients were over 45 years or older. When asked to describe the therapeutic benefit they received from medicinal cannabis, patients reported relief of pain, muscle spasms, headaches, anxiety and improved sleep and relaxation as the most common reasons for using medical marijuana (Reinarman et al., 2011). Pain from back and neck were the most frequently cited reasons recorded by evaluating physicians followed in frequency by sleep disorders, anxiety/depression, muscle spasms and arthritis. Half of this sample reported using medical marijuana as a substitute for prescription medications while four in five patients (79.3%) reported that they had tried a variety of traditional and alternative therapies before seeking a medical marijuana card (Reinarman et al., 2011). Nearly half (48.7%) of the patients had tried physical therapy, 36.3% chiropractic services, and 22.3% reported having surgery for their conditions. The researchers found tobacco use in this sample was somewhat higher than in the general population but the prevalence of alcohol use was significantly lower (Reinarman et al., 2011). They note that if the patients perceive that risk of disclosure could prevent them from obtaining the card, illicit drug use reports may be underestimated (Reinarman et al., 2011). Amounts used per week varied, from three grams or less to seven or more grams; however, two-thirds

(67%) reported using medical marijuana daily while one-fourth (26%) reported using less than once a week. Patients consumed medical marijuana primarily in the evenings (52.3%) or prior to sleep (56.1%) and the mode of administration was predominantly inhalation (86.1%) (Reinarman et al., 2011).

Reinarman et al.'s data do not support nor did they find evidence that these medical marijuana patients were seeking cannabis for non-medical use or diversion (2011). Two-thirds of the patients in this sample had not used marijuana recreationally prior to trying it for medicinal purposes. They acknowledge that drug diversion is not unique to medical marijuana; patients obtain numerous drugs such as Valium, Ritalin, and Oxycontin through legal medical channels and then use for non-medical purposes (Reinarman et al., 2011). The researchers conclude that the diversion issue will remain important as medical and nonmedical drug use is becoming an increasingly blurred line (Reinarman et al., 2011).

Acknowledging that the demographic shift has great significance for the American healthcare system because older persons use services considerably more than younger Americans and that their needs are often more complex, White, et al. (2011) examined archived data from the NHSDA (n=1,103) and NSDUH (n=5,830). Although these surveys were designed to provide yearly data (1985, 1986) on the use of alcohol, tobacco, illicit and prescription drugs in the US, for the purposes of this study the researchers compared lifetime and current prevalence rates for older Americans. To ensure that baby boomers would be included in the sample, they defined the age to be 50 years of age or older (White, et al., 2011). Alcohol use showed little change from 1985 to 2006 however there was a significant decline in the number of adults reported to be currently smoking, and a lower proportion of older Americans who had ever smoked. White, et al. found clear support that the population in 2006 would show significantly greater proportions of older adults who had ever used and who currently use illicit drugs (2011). In 2006, for each of the six illicit drugs studied (marijuana, cocaine, heroin, PCP, hallucinogens,

inhalants), the proportion who had ever used increased, and current use was greater for marijuana, cocaine and inhalants (White, et al., 2011). Current marijuana use rose from 0.3% in 1985 to 1.6% in 2006. The researchers note that while the percentage may appear small, this amounted to more than an additional 1.25 million older Americans currently using marijuana. They attribute this not only to the social trends from the 1960s and 1970s, but represented an increase in the use of medical marijuana in the later years (White, et al., 2011).

Chapter Three: The Legal Landscape

In this chapter the state legalization of marijuana for medicinal purposes is examined. This is a rapidly changing landscape as legalization efforts continue across the United States. Medical marijuana laws (MMLs) vary from state to state although there is common criteria for the issuance of identification cards and for physician reporting. Distribution and the availability of product through legitimate businesses continues to be a challenge post-legalization due to the conflicting federal drug policy. Further research will be critical to know the full impact of legalization on the rates of use, medicinally and recreationally.

State legalization of medical marijuana may be associated with potential health, economic and social gains beyond the findings in this research. Recent research in the shift in demographics of users may provide us with trends in age-period cohorts that will better enable us to care for the needs of our population. The purpose of the Ryan-Ibarra et al. (2015) study was to examine the demographic differences between 7,525 users and non-users of medical marijuana in a California population-based study. Only 5.15% of adults reported ever using medical marijuana and of those, 92% believed medical marijuana helped alleviate symptoms or treat a serious medical condition (Ryan-Ibarra et al., 2015). While medical marijuana use reported in all age groups, the 18-24 years of age group had the highest prevalence of ever having used medical marijuana. Medical marijuana was used to treat chronic pain by 31% of the sample using medical marijuana, followed by arthritis (10.7%), migraines (8.43%) and cancer (6.75%). Ryan-Ibarra et al. suggest that while diversion could be a factor in those using medical marijuana their data did not verify the self-reported diagnoses by medical marijuana users, who comprised all age groups, but nearly all reported that it helped them treat a serious medical condition (2015). Further, at least as it relates to the California population, the evidence shows that medical marijuana is used equally by all age groups, and not used exclusively by any one group (Ryan-Ibarra et

al., 2015). They conclude that, as legalization of medical marijuana continues across the US, it will be important to track use as a health-related behavior and possible risk factor (Ryan-Ibarra et al., 2015).

In another study (Cerdá et al., 2012), researchers wanted to test the relationship between state-level legalization of medical marijuana and marijuana use, abuse, and dependence. They used data from 34,653 respondents, aged 18 years and above, from the second wave of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), a national survey. They measured past-year cannabis use and DSM-IV abuse/dependence by asking the following questions: 1) Did states that legalized marijuana by 2004 exhibit higher rates of past-year marijuana use and abuse/dependence in 2004 and 2005 than states that did not legalize it? 2) Were individuals living in states that legalized medical marijuana at higher risk for marijuana use, abuse and dependence in the past year than individuals who lived in states that did not legalize medical marijuana? 3) Among marijuana users, was residence in a state that legalized marijuana associated with increased risk for meeting criteria for marijuana abuse and dependence? This study showed that states that legalized medical marijuana had significantly higher rates of marijuana use, abuse and dependence (Cerdá et al., 2012). Their findings do not indicate a causal effect of legalization of medical marijuana on marijuana use, abuse and dependence but do suggest the need to consider other possible explanations or mechanisms for the relationships they found (Cerdá et al., 2012).

First, state-level community norms more supportive of marijuana use may contribute to the legalization of medical marijuana and to higher rates of marijuana use. Passage of MMLs may reflect underlying community norms particularly when passed by voter referenda. Cerdá et al. assert that the MMLs that passed in state legislatures by wide margins of votes may reflect an underlying high level of support prior to their enactment and an absence of strong and vocal opposition (2012). Second, the enactment of MMLs could lead to a change in community attitudes on both medical and non-medical

use, including reduced disapproval and perceived riskiness of use, which could then subsequently reduce marijuana use, abuse and dependence (Cerdá et al., 2012). A third potential mechanism underlying the association between MMLs and marijuana use, abuse and dependence is medical endorsement of its use for medical purposes. They claim that no consensus exists on the effectiveness of treatment for symptoms of pain, nausea, vomiting, and other problems caused by illnesses and or treatment, therefore the medical community has not delivered a clear message to the public (Cerdá et al., 2012). Finally, the fourth potential mechanism relates to marijuana availability. They suggest that legalization of marijuana for medical purposes may lead to greater commercial promotion and availability for recreational purposes, which may contribute to greater illicit use of marijuana (Cerdá et al., 2012).

The mechanism related to marijuana availability raises a question as to the relationship between availability and the increased potency of the drug. The effects of medical marijuana laws on the drugs' potency examined in the Sevigny et al. (2014) study showed that marijuana potency has risen drastically over the past two decades although it remains unclear whether state medical marijuana policies have contributed to this increased strength. Although recent attention given to whether vaguely written MMLs contributed to the rise in recreational marijuana use, Sevigny et al. argued that no attention to the impact these laws have on consumption has resulted (2014). They suggest that a rise in potency could be associated with a decline in the total quantity of marijuana consumed, as higher potency marijuana would require less marijuana to reach the same level of intoxication. They analyzed 39,157 marijuana samples seized by US law enforcement between 1990 and 2010, measured by tetrahydrocannabinol (THCA) content. The researchers assert that while no state law directly regulates the THC content of medical marijuana, there is some evidence that the potency is higher than that of recreational marijuana sold on the black market (Sevigny et al., 2014). Further, that the allowance for growing high-grade marijuana for medical purposes including home cultivation, growing dispensaries

and caregivers has contributed to the upward trend in potency in the recreational markets (Sevigny, et al, 2014). Testing a number of variables including a general MML indicator, state decriminalization policies and marijuana enforcement efforts, they examined urban landscapes and indoor grows, outdoor plots seized, and marketplaces. They considered the possible indirect effects of marijuana policy on potency (Sevigny et al., 2014). The seizures included different categories of marijuana (sinsemilla, mid-grade, and kilobrick), from various market places driven by competition and market share. They found evidence that the average potency of marijuana seized by law enforcement increases by half a percentage point on average after legalization of medical marijuana, which they determined to not be significant (Sevigny et al., 2014). When the researchers examined specific medical marijuana provisions, in the states that legally permit dispensaries average potency is one percentage point higher over time. They conclude that further research is necessary to understand the practical significance of a one, two or five percent increase in average THC content and the implications for public health outcomes (Sevigny et al., 2014).

The potential impact of legalizing medical marijuana on both medical and recreational marijuana use has received much attention; therefore, several studies have addressed initiation of age of marijuana use. For what purpose? In the Harper et al. (2012) study, researchers replicated a study that found greater adolescent marijuana use in states that have passed MMLs. They used NSDUH data from 2002 through 2009 on the state-level prevalence of past-month marijuana use and perceived riskiness of monthly marijuana use from the publicly available estimates provided by the US Substance Abuse and Mental Health Survey Administration. State-level estimates are 2-year averages provided for four age groups, ages 12 and over, 12-17, 18-25, and 26 years and over (Harper et al., 2012). Their primary evidence compared the prevalence of marijuana use in state with and without MMLs. They replicated the findings of an earlier study (Wall et al. 2011) that marijuana use was higher in states that have passed MMLs, and their analysis suggests this is not a causal association (Harper et al., 2012).

None of the estimates suggested any positive or negative impact of passing MMLs on perceived riskiness (Harper et al., 2012).

Chapter Four: Treatment Implications

In this chapter treatment needs for baby boomers are examined. This generation will require a different approach from healthcare providers for their physical and psychological health. Baby boomers will expect to have more input and control regarding their health and treatment options which may include the use of marijuana as a legitimate therapeutic option.

The Bottorff et al. (2013) study of 23 Canadian medical cannabis user's collected self-described perceptions and responses to stigma associated with this use during semi-structured interviews. The mean age was 45, slightly younger than the youngest baby boomers. All participants were MMAD license holders or medical cannabis dispensary members; therefore, their use of medical cannabis was legitimate. The results provided insight that the stigmatization associated with medical cannabis use is both complex and overlapping because of three factors: the lack of knowledge about medical cannabis, the ambiguous status of cannabis, and the stigma associated with some health disorders or diseases (Bottorff et al., 2013). Suspicion of risky behaviors was interpreted as irresponsible acts and a disregard for a healthy lifestyle. It was evident that while public acceptance continues to grow, the participants in this study reported that experiences of stigma related to medical cannabis use came from family and friends, healthcare providers, law enforcement and their own internalized guilt related to using a medication used both recreationally and illegally (Bottorff et al., 2013). Stigmatization related to cannabis and its illegal status are interlocked. Engaging in illegal activities generally stigmatized by society and criminalizing activities renders them deviant (Bottorff et al., 2013). While deviance and criminality were not largely reported by the participants as self-concepts for those living with a chronic, life-limiting illness, additional stigmatization resulted in increased physical and emotional distress. The researchers concluded that while the therapeutic use of cannabis has not reached accepted standards of practice in North America, the growing body of evidence supporting its availability and use as a viable

medical treatment is forcing the hand of physicians and healthcare providers to consider its potential value as a therapeutic agent (Bottorff et al., 2013).

The Kondrad & Reid (2013) study was the first to gather information about physician attitudes toward the use of medical marijuana. An anonymous web-based survey on individual and practice characteristics, as well as experience with and attitudes toward medical marijuana was distributed to 1,727 members of the Colorado Academy of Family Physicians listserv. The first part of the 3-part survey asked for demographic information including age, years in practice, sex and whether the subject had an unrestricted medical license. The second part concerned respondents' experience with medical marijuana including whether they had recommended it, how many times, for which conditions, and from what sources they obtained their information about medical marijuana. In the third section respondents were asked to rate on a 5-point scale the extent to which they agreed or disagreed with 17 statements about marijuana policy in Colorado and nationally, including: legalization of marijuana for recreational use, reclassifying marijuana from a Schedule 1 drug, distribution through a dispensary model, the benefits and risks of marijuana use, and educational opportunities about marijuana at various levels of medical training. The physicians' response rate was 30% (520) which is in the normal range (Kondrad & Reid, 2013).

Of the physicians surveyed 31% reported ever recommending medical marijuana to a patient; however, the majority of those who recommended it had prescribed it to between one and five patients. Frequent reasons for recommending medical marijuana included conditions such as cancer. Of those who recommended medical marijuana, 76% of physicians reported recommending it at least once for "severe pain," this is far less than expected, given that 94% of patients on the state registry are on it for this reason (Kondrad & Reid, 2013). A significantly higher number of respondents who had not recommended marijuana for a patient cited news media and practice policy as sources of information;

they also cited dispensary owners and recreational use by family and friends (Kondrad & Reid, 2013). This group also identified "other" influences significantly more frequently which included personal opinion (35%), concerns about legal liability or licensure (23%), and lack of evidence (13%). Of responding physicians, 46% said that physicians should not recommend marijuana as a medical therapy at all while 19% said physicians should recommend medical marijuana. Most physicians agreed that there were significant physical (61%) and mental (64%) health risks with marijuana use (Kondrad & Reid, 2013). When asked about benefits of marijuana, 27% agreed that there were significant physical health benefits while 41% disagreed and 15% agreed that there were significant mental health benefits while 54% disagreed. Just slightly more respondents (44% to 37%) disapproved of the DEA reclassifying marijuana from a Schedule 1 drug and approximately 30% of the physicians agreed with legalization of recreational marijuana, while 50% disagreed. Overwhelmingly, 92% of respondents agreed that physicians should have ongoing relationships with patients for whom they have recommended medical marijuana. Similarly, 95% of those surveyed agreed that physicians should not have financial relationships with dispensaries. There was considerable agreement among physicians about the need for further education and training on medical marijuana (Kondrad & Reid, 2013). Over 80% thought that training should be part of medical school curricula and 92% agreed that continuing medical education (CME) on medical marijuana be made available to primary care physicians. Nearly 81% agreed that physicians should be required to have formal training about medical marijuana before recommending it to patients (Kondrad & Reid, 2013).

Discussion

Historically, cannabis was made illegal not because of problems associated with its use but rather as a result of government influence encouraging the public to view it as risky and deviant (Lyman, 2013). It is widely acknowledged that the baby boomer cohort epitomized cultural change and is most closely associated with rejection of authority, government, and tradition. Baby boomers can be instrumental in changing the perception that cannabis has no value beyond the short-lived euphoric buzz one gets from recreational use. This cohort's prior exposure may affect social norms with respect to use and misuse.

By 2030, there will be roughly 79 million Americans over the age of 65 years. Marijuana is the most commonly used illicit substance among older adults in the general US population (DiNitto & Choi, 2011). Studies such as this one show that the number of older adults using marijuana is increasing and these numbers are ahead of projections. Of course, not all aging adults who use illicit drugs have an addiction or abuse problem. It could be that the majority of aging adults using marijuana are somewhat experienced and at low risk of harming themselves. Unlike the use of other illicit drugs there is considerable debate about the benefits of marijuana use. For these reasons, there is an urgent need to understand the prevalence of its use particularly among aging adults. Older adults may be attracted to it to help ease pain or other symptoms of medical conditions that worsen in older adulthood (DiNitto & Choi, 2011). Even though there are potential clinical benefits from its use, marijuana is usually smoked which carries certain physical risks particularly related to respiratory issues. However, at least some of the time, medical marijuana users are choosing alternative modes of administration that reduce the perceived risk of harm from smoking. As described in the Lau (2015) study, this is referred to as harm reduction – a set of strategies aimed at minimizing the negative effects of drug use, accepting that abstinence is neither a realistic or desired goal.

Health and social service providers may educate older adult marijuana users about potentially negative physical and mental health problems in efforts to reduce or stop use. Older adults may be less likely to perceive substance use as problematic or to seek treatment than adults who are younger (Black & Joseph, 2014). Specialized treatment for the baby boomer cohort that is supportive and non-confrontational will be essential. Declines in physical health, cognitive impairment or severe comorbid conditions may interfere with older adult's recall of drug use behaviors and physicians' refusal to write recommendations for medical cannabis can strain doctor-patient relationships and force users to the underground market.

The number of adults aged 50+ with a substance use disorder may exceed estimates because we are relying on self-reported data, and the institutionalized populations (e.g. hospitalized, incarcerated) are often excluded from many studies; yet, information from this group could provide healthcare providers with vital information regarding correlations between substance use and misuse and mental illness. As we learned from the Reinarman (2011) study, there is a large unknown number of people who use marijuana medicinally but who have not sought physician recommendations or official patient ID cards, perhaps because of the expense involved or perhaps because they are part of the invisible population. Aging adults from socially marginalized groups, such as individuals with mental illness may be choosing to self-medicate.

Nonetheless, the impact on the healthcare system will be significant as treatment needs remain high primarily due to the sheer numbers of an aging baby boomer population. It is possible that a cohort once described as vocal, radical, and action-oriented in its youth have become part of an invisible epidemic, older adults as a growing at-risk population. Older adults may not want to stop using because they do not perceive the potential negative consequences of use on overall health, mental health and social functioning. They may not connect low-level symptoms to substance abuse. For example,

individuals may associate mild depression with part of the aging process rather than substance abuse. The good news is that although aging adults are less likely to report substance use and misuse, they are more likely to respond better to substance abuse treatment (Choi et al., 2014).

New studies explore medicinal marijuana as a treatment for veterans suffering from Post-Traumatic Stress Disorder (PTSD) and other chronic, physical and mental illnesses sustained in active duty (Tull et al., 2016). According to most definitions, PTSD is a psychiatric disorder that can occur following a single or repeated experience or witnessing of a life-threatening event such as military combat, natural disasters, terrorist incidents, serious accidents, or physical or sexual assault in adults or childhood. Treatment for PTSD includes psychotropic medication and/or psychotherapy which have been documented as effective; however, there is need to better identify and treat PTSD in aging adults, particularly older veterans, as many continue to suffer from PTSD for decades after service and into late life. For example, WWII and Korean War veterans have a PTSD prevalence rate of 12%, 45 years after combat (Beristianos, 2016). Baby boomers who are veterans from the Vietnam War are now coming forward with PTSD diagnoses and may be more receptive to medicinal marijuana if it were determined to be a viable option for treatment. Future research is needed to determine whether specific withdrawal symptoms and marijuana problems vary with PTSD status (Boden et al., 2013). Successful treatment of PTSD is significant because of the detrimental effects it can have in late life, such as cognitive impairment, increased risk of cardiovascular disease, increased risk of dementia and increased risk of disability. Continued research will be essential in order to improve the health outcomes of aging adults and to determine if PTSD could possibly accelerate the aging process.

Many aspects of existing medical marijuana laws are relatively consistent across states (where legal). One way in which it is less clear is how the criteria vary from state to state. For example, PTSD is not included among the qualifying criteria in the majority of states with MMLs. Users must have one or

more qualifying conditions (e.g., cancer, anxiety) that a physician must document and submit officially to the state. The state provides an authorization card to the patient for renewal on a regular basis to remain active. Patients can either grow a small amount or obtain it from a "caregiver."

As more states are legalizing medicinal marijuana, the dispensaries may not be set up to provide access, forcing customers/patients to the black market or to attempt to grow their own. In Hawaii, medical marijuana was legalized in 2000, but there was nothing written into the law about obtaining the marijuana. In 2015, there were specific provisions written into the MMLs including rules governing the dispensary program, expected to be finalized in January 2016, with dispensaries scheduled to be built and operational by July 2016. As of January 2017, there are no operational dispensaries in Hawaii, 17 years after the legalization of medicinal marijuana (Hawaii.gov, 2017).

The potential impact laws will have on potency was examined in the Sevigny et al. (2014) study. States with laws limiting legal possession to small quantities might encourage production of higher potency strains. How this increases the risk, (i.e., drugged driving, drug-induced psychosis, and other negative public health outcomes) has yet to be determined.

Conclusion: A Path Forward

While many important issues surfaced in the research presented, several key themes emerged. First, the baby boomer cohort is reporting rates of marijuana use that are higher than ever recorded in their age bracket. They are more likely to consider the health benefits of marijuana than older cohorts are. Could the benefits to medicinal marijuana outweigh the risks that they associate with its use? We need to be able to provide science-based information for all cannabis users whether they are using medicinally or recreationally, in order for them to make informed decisions about the most appropriate delivery system to meet their needs. Safer administration will be a key factor in maintaining long-term health for baby boomers.

The baby boomer cohort will demand more open, honest discussions with healthcare providers, including the use of medical cannabis as a viable option for pain management, sleep disorders and other mental and physical conditions. Perhaps not surprisingly, there is considerable agreement among physicians about the need for further education and training on medical marijuana. The evidence shows that cannabis is widely used for medicinal purposes in the US to treat an array of diseases and symptoms and has shown some of the most promising results in the treatment for chronic pain relief, nausea related to chemotherapy, controlling epileptic seizures, and reducing eye pressure for glaucoma (Reinarman et al., 2011, Nunberg et al., 2011). Continued research into the long-term trajectory of mental health problems including PTSD of veterans across their lifespan associated with their exposure to combat will be critical in caring for this aging population.

Second, the aging of this cohort has widespread health and treatment implications including a consensus that the potential for substance use and misuse could increase markedly. These projections of substance abuse are based on this cohort's early and continuing acceptance and involvement with marijuana. There will be increasing demands placed upon the substance abuse treatment system as

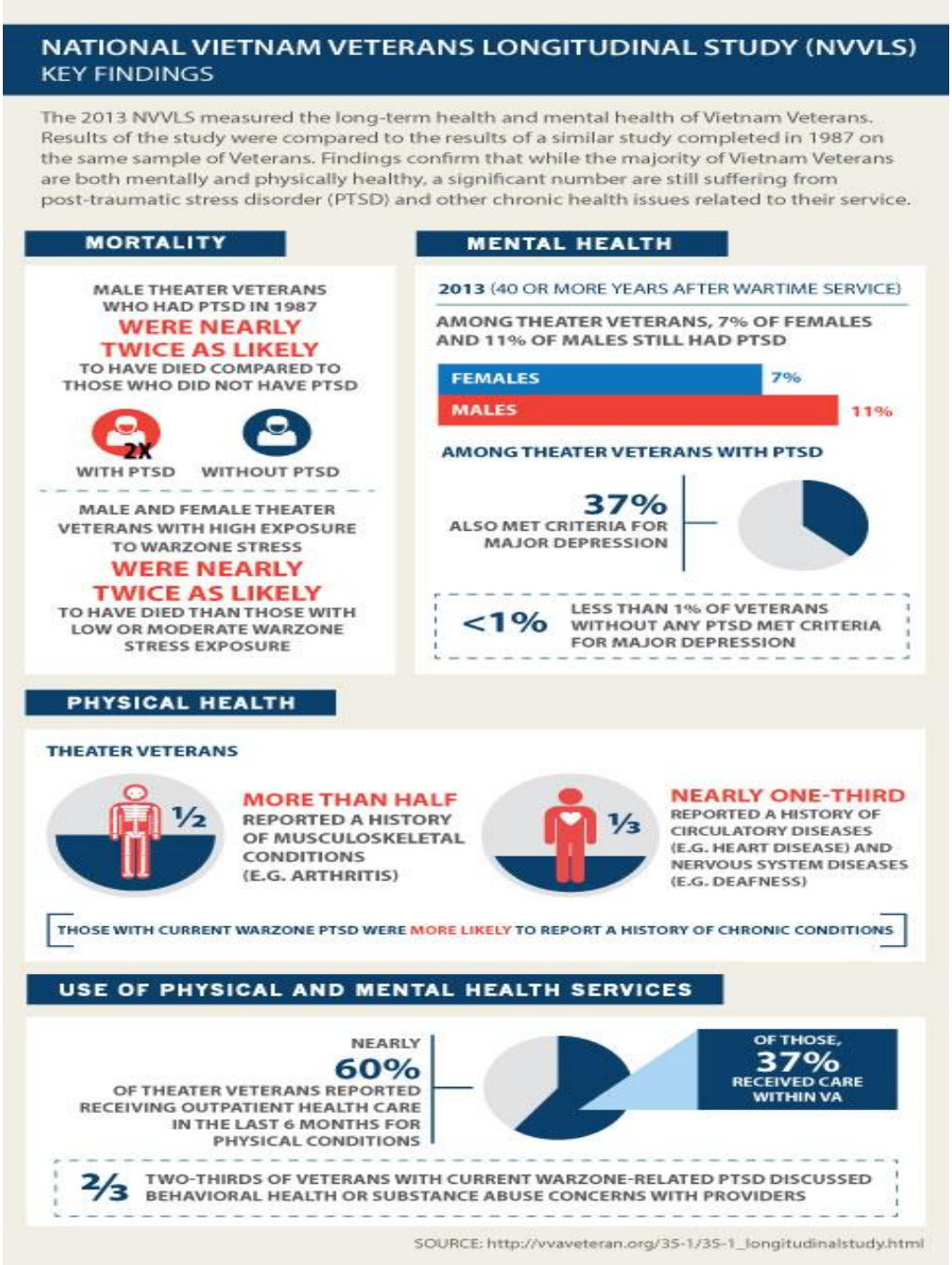
estimates of aging adults entering treatment will rise sharply over the next decade. Designing age-specific treatment programs will be essential for this cohort. It will be interesting to see how medical marijuana affects the medical noncompliance issue for older adults. Will this cohort choose medicinal marijuana over the pharmaceutical medications for which they are routinely prescribed?

Finally, policy will be key as legalization efforts continue across the nation. What remains unknown is whether the federal government will continue to stand in the way of progress. Currently marijuana remains illegal throughout the US at the federal level and is not approved for medicinal purposes; however, 29 states and the District of Columbia have legalized it for medical use (Appendix C). The unwillingness to allow new scientific discovery to put to rest longstanding ideology and to perpetuate bureaucratic hurdles through an antiquated drug classification system has already resulted in the states' defiance of federal law. As legalization continues across the country law enforcement will become increasingly complex because users are transporting across state lines. Access will likely become an issue, as users traverse between legal dispensaries and the black market, facing social stigmatization and deviant behavior. Dispensaries carrying non-psychotropic CBD and CBN are opening in states such as North Carolina where MMLs are not in place; however, dispensary owners continue to face site opposition and building permit issues. Older illicit drug users not in contact with the criminal justice system may go undetected without interventions by health care providers to educate the public (Lofwall, 2008).

As more states approve legalization, the research and potential of this medicinal plant will continue to unfold. A causal link between MMLs and method of cannabis administration could provide legislators and policy makers with vital information of the potential impact of alternative, safer methods of cannabis consumption. If we are ever going to be able to manage the burden that an aging society will place on healthcare and social services, policy changes must be made sooner rather than later to

meet the long-term care needs of baby boomers. This conclusion presents clear opportunities for health care providers and policy makers as it relates to improving the lives of three groups, often marginalized by society – those suffering with mental illness, substance abuse and our veterans. The evidence presented here indicates that aging baby boomers are considering marijuana as a legitimate therapeutic option. It is difficult to know the true numbers of medicinal marijuana users as we are relying on self-reported data on use of an illegal substance. There is evidence that suggests the greatest benefit from medicinal marijuana may be in the relief of physical ailments, such as nausea and pain, but perhaps less effective and potentially harmful for people suffering with mental health conditions. For veterans who may be suffering with both physical and mental health conditions, treatment with medicinal marijuana becomes even more complicated. Continued research to investigate both the potential benefits and possible risks of medicinal marijuana will be essential to learn who can benefit most from medicinal marijuana and who should avoid using it. Meeting the healthcare needs of 79 million older adults will stress both technological and healthcare resources like never before and there is good reason to expect that looking forward, medicinal marijuana will become a routinely prescribed therapeutic option.

APPENDIX A: CHART – 2013 NATIONAL VIETNAM VETERANS LONGITUDINAL STUDY:



Source:
http://www.clackamasveteranssupport.com/agent%20orange/Agent%20Orange%20newsletter.pdf

APPENDIX B: PTSD DISABILITY CASES PAID

CONFLICT

WW II era

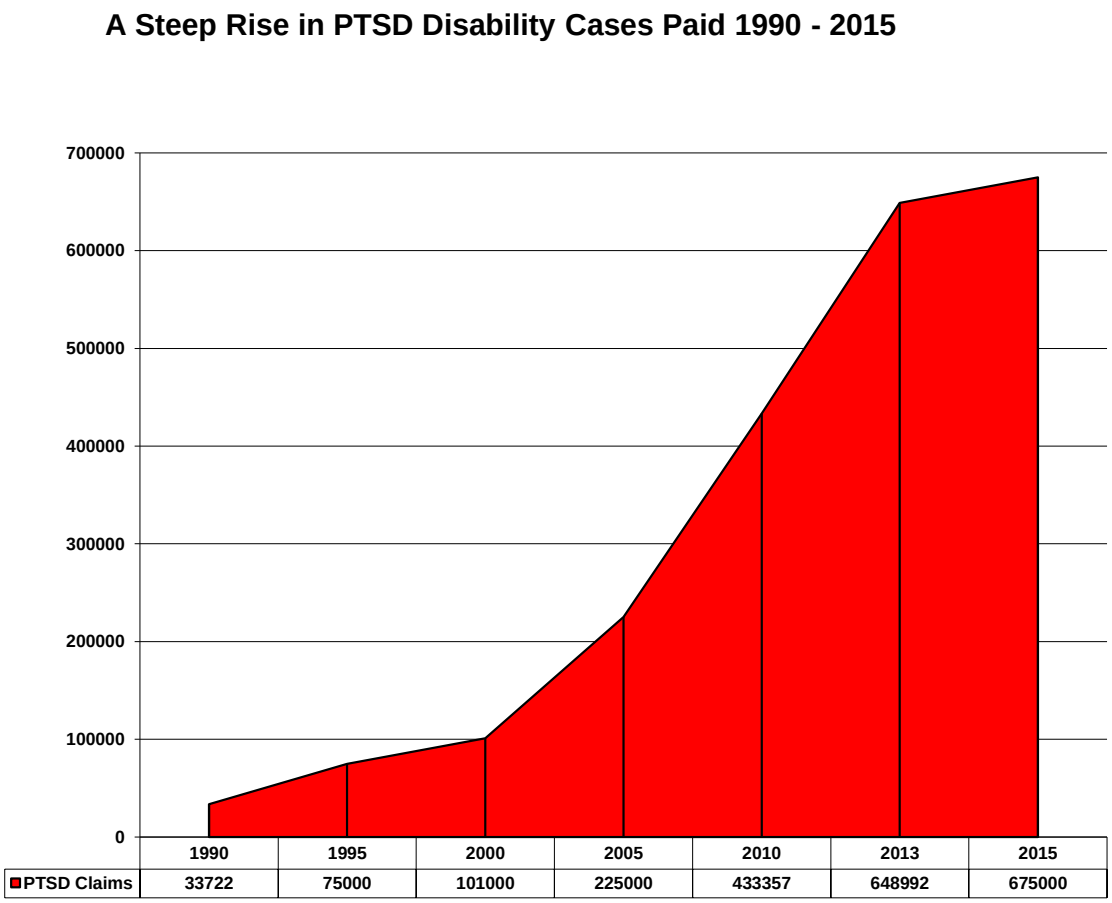
(1941-1946)

Korean War era

(1950-1955)

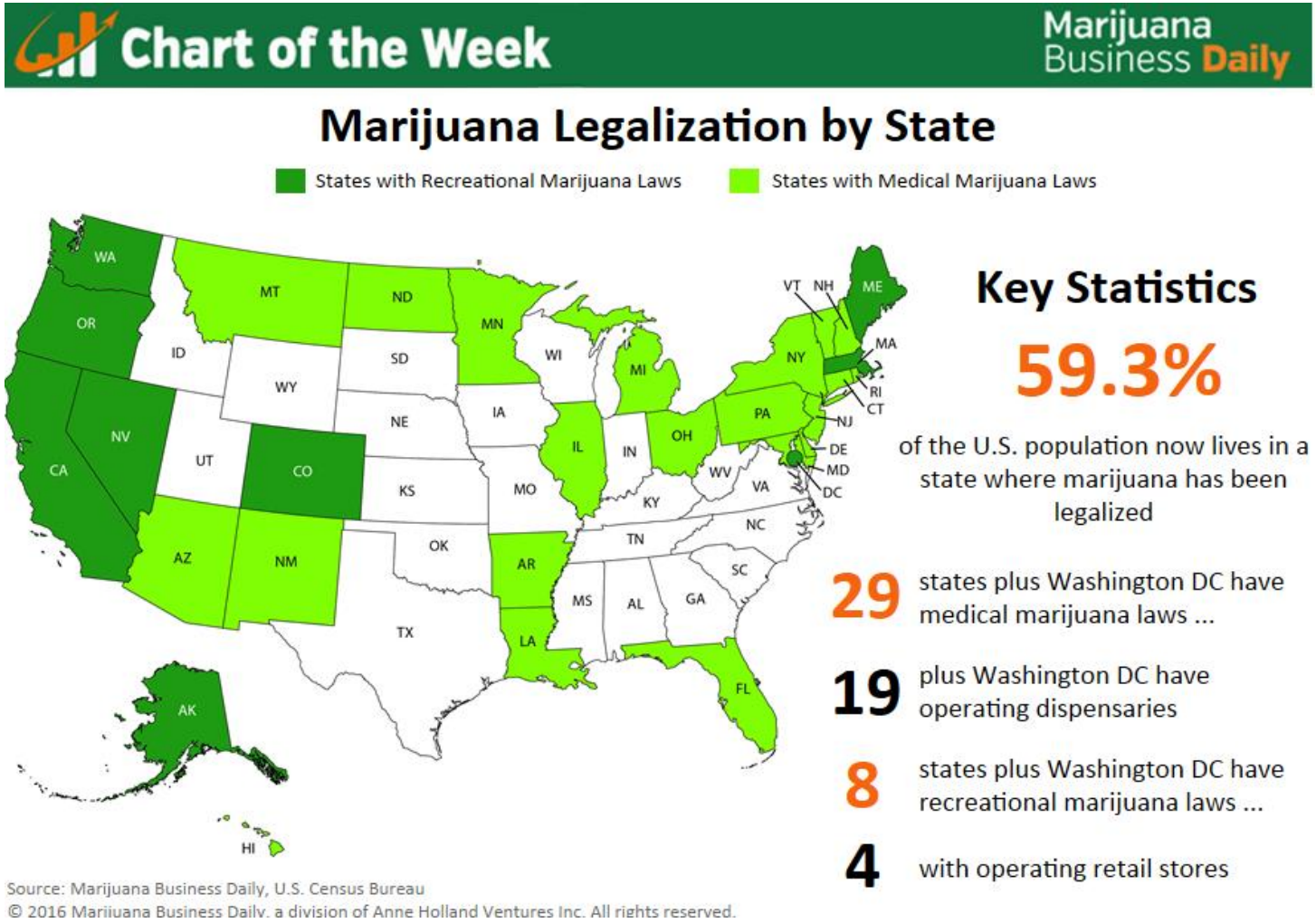
Vietnam War era

(1961-1975)



Source adapted from: http://www.latimes.com/nation/nationnow/la-na-nn-ptsd-vietnam-20140808-story.html

APPENDIX C: MAP - CURRENT US LEGALIZATION BY STATE:



Source: https://mjbizdaily.com/chart-majority-of-u-s-embraces-legal-marijuana/

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