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LONG-TERM OUTCOMES OF CHRONIC, RECREATIONAL MARIJUANA USE

Amidst insistent, nationwide demand for the acceptance of recreational marijuana, many Americans champion the supposedly non-addictive, inconsequential, and creativity-inducing nature of this “casual” substance. However, these personal beliefs lack scientific evidence. In fact, research finds that chronic adolescent and young adult marijuana use predicts a wide range of adverse occupational, educational, social, and health outcomes. Cannabis use disorder is now recognized as a legitimate condition in the Diagnostic and Statistical Manual of Mental Disorders and cannabis dependence is gaining respect as an authentic drug disorder. Some research indicates that medical marijuana can be somewhat effective in treating assorted medical conditions such as appetite in HIV/AIDS patients, neuropathic pain, spasticity and multiple sclerosis, nausea, and seizures, and thus its value to medicine continues to evolve (Atkinson, 2016). However, many studies on medical marijuana produce mixed results, casting doubt on our understanding of marijuana's medicinal properties (Atkinson, 2016; Keehbauch, 2015). From the surge of modern research on marijuana use comes convincing data confirming the link between regular, recreational marijuana use and memory loss, reduced coordination, paranoia, and chronic, decreased motivation and irritability as well as psychotic disorders, increased risk of delinquency, antisocial behavior, and employment instability (Atkinson, 2016; Brook, 2011b; Doherty, 2017; Gilman, 2015). These symptoms are ill suited for the standard demands and duties of maintaining employment, sustaining interpersonal relationships, raising children, and excelling in academics and careers.

MARIJUANA'S STRUCTURE, CHEMISTRY, AND EFFECT ON HUMAN PSYCHOLOGY

Cannabinoids are the main psychoactive ingredients in marijuana. The most predominant cannabinoid is Δ^9 - tetrahydrocannabinol (THC), which produces the well-known and widely craved feeling of a marijuana “high.” Another common cannabinoid is cannabidiol (CBD), which does not evoke the same euphoric effects as THC but is still widely used. While many advocates of marijuana claim that the drug is unique and distinctive in nature from other common drugs of abuse, studies find that marijuana impacts the same mesolimbic dopamine system as other drugs (Atkinson, 2016). The endocannabinoid system of the brain, the chief target of THC, regulates numerous functions including the sensitivity and reactivity of neurons and the release of particular neurotransmitters (Gilman, 2015). The neurotransmitters influenced by THC are those responsible for the management of mood, pain, sleep, appetite, memory, pleasure, and muscle activity (Atkinson, 2016; Gilman, 2015). Thus, artificial overstimulation of the endocannabinoid system produces the “high” and disrupts the brain's inherent cannabinoids (Gilman, 2015). Because of its sedative effects on neurotransmitters particularly associated with sleep, motivation, pleasure, mood, and memory, marijuana causes a measurable deceleration in neurocognitive processing speed as well as deficits in attention and working memory (Atkinson, 2016). Short-term memory tasks are found to be consistently impaired in both human and animal models under the influence of marijuana and people intoxicated by marijuana tend to incorrectly estimate time intervals and complete tasks at a notably slower pace than those who are sober (Atkinson, 2016). Long term marijuana use is associated with enduring structural changes to the amygdala, hippocampus, and prefrontal cortex; these changes are correlated with problems in neurocognitive performance, information processing, IQ, memory, and attention (Aria, 2015). Furthermore, longitudinal studies reveal a progressive decline in IQ in long-term marijuana

users; this finding is alarming because for the vast majority of the population, IQ remains relatively stable throughout life with little to no fluctuations (Atkinson, 2016). It is inarguable that chronic, recreational, and long-term marijuana use exerts adverse effects on the motivation and euphoria centers of the brain, general cognition, fear systems, memory, reality testing, and motor circuits (Atkinson, 2016).

MARIJUANA AND ADDICTION

Despite many chronic users' passionate proclamations, marijuana is scientifically shown to cause addiction in 17% of adolescent users and nearly 30% of daily users (Gilman, 2015). This addiction is much like other drug addictions, impacting the neural mechanisms of tolerance and the cognitive reward system (Gilman, 2015). However, cannabis dependence emerges in only 9% of all marijuana users, which may explain why the larger society believes this substance to be non-addictive (Gilman, 2015). Nonetheless, laboratory and clinical studies find chronic marijuana users to experience withdrawal symptoms upon discontinuation of marijuana consumption; marijuana withdrawal symptoms include craving, anxiety, irritability, and sleep problems (Cooper, 2008). An estimated 20% of American high school students who report having tried marijuana become daily users of this drug (Cooper, 2008). Studies find that 90% of users who seek treatment for their marijuana abuse are not successful in their attempts to stop smoking cannabis (Cooper, 2018; Gilman, 2015). People who enroll in marijuana dependence treatment programs have typically used marijuana daily for an average of ten years and have made, on average, six previous attempts to decrease or end their use (Gilman, 2015). Researchers do not yet understand why some individuals demonstrate a greater predisposition for and vulnerability to marijuana dependence than others and knowledge of the true extent of this drug's nature and its effects on the human body is incomplete, but it is doubtless that marijuana use can in fact provoke addiction in some users, contribute to a severe reduction in motivation and perseverance, and retard the neurocognitive functioning and overall cognition of long-term users. It is understandable that any substance abuse and addiction is likely to interfere with an individual's ability to function efficiently, rise to challenges, and persevere during times of stress. Earning a postsecondary education degree and maintaining employment are tasks that require persistence, alertness, and stamina, therefore if one is frequently consuming a substance that is known to threaten these important functions, it is unlikely the person's educational and occupational success will go unaffected.

MARIJUANA AND MOTIVATION

The wave of new studies revealing the numbing and hindering effects of marijuana on the human brain includes new evidence for the particularly harmful influence of this substance on motivation, a crucial element in academic and career success. Despite marijuana's ability to soothe and calm some users as well as offer medicinal relief for some medical conditions, long-term, recreational marijuana use is increasingly associated with mental discomfort, anxiety, and overall malaise (Ames, 2018; Anderson, 2015; Atkinson, 2016; Brook, 2011a; Brook, 2011b; Buckner, 2009; De Graaf, 2007; Doherty, 2017). A research study published in the journal of *Prevention Science* articulated that regular marijuana use is associated with future impairments of self-efficacy, confidence, and motivation (Lac, 2018). The researchers also found that college students regularly using marijuana were predisposed to fall short in terms of their initiative,

persistence, and motivation, even when variables of demographics, personality, and other substance use were controlled (Lac, 2018). The relationship between marijuana use and decreased motivation resurfaces in numerous other studies, including one published in *Translational Issues in Psychological Science*, which found participants who used marijuana fifty-two days or more in the last year report significantly higher levels of amotivation and apathy (Meir, 2018). It is important to note that these attitude traits, like motivation and persistence, are among the most crucial factors required to earn a degree, obtain and maintain employment, and confront difficult academic, career, social, and personal issues with resilience and vigilance. Authors of *Marijuana and Mental Health* explain that marijuana causes a decrease of dopaminergic transmission in the striatum of the brain, resulting in a brain that is notably less sensitive to dopamine and exhibits decreased reactivity to challenges (Atkinson, 2016). This measurable decline in marijuana users' motivation and persistence may interfere with their ability to work diligently towards educational and career goals, confidently confront obstacles in their path, develop innovative strategies to help reach their goals and handle issues, meet employment requirements, and work to sustain important interpersonal relationships.

MARIJUANA AND ANXIETY AND MOOD DISORDERS

Numerous studies report a growing association between marijuana use and mood and anxiety disorders (Ames, 2018; Anderson, 2015; Atkinson, 2016; Brook, 2011a; Brook, 2011b; Buckner, 2009; De Graaf, 2007; Doherty, 2017). According to Buckner, 2018, approximately half of all individuals diagnosed with cannabis dependence disorder also exhibit symptoms of an anxiety disorder (Buckner, 2018). This aspect of marijuana is both controversial and obscure, for many individuals find that cannabis induces relaxation, euphoria, and an overall calming and sedative effect, however others experience anxiety, unpleasant perceptual distortions, and dysphoria (Atkinson, 2016). Researchers believe that the discrepancy in experience is due to THC's dual ability to both enhance and block endocannabinoid neurotransmission, creating drastically different effects in different users depending on how their brain chemistry interacts with the drug (Atkinson, 2016). A 2002 National Comorbidity Survey found that 90% of respondents with clinically diagnosed cannabis dependence also reported a lifetime prevalence of a mental disorder, while 55% of those without cannabis dependence did not report a mental disorder (Atkinson, 2016). The comorbidity of cannabis dependence and mood disorders is statistically significant and revolutionizes our understanding of how drug use interacts with the mental health of an individual, specifically those with preexisting mood disorders. A 2007 Australian study reported a three-fold increase in depression and anxiety symptoms among young, early, and frequent marijuana users (Atkinson, 2016). This indicates that heavy marijuana use, particularly among the youth, can have powerful, negative effects on users' emotions and attitudes. Recent research also indicates that people with social anxiety disorder (SAD) are particularly susceptible to marijuana use and its corresponding problems (Buckner, 2009). Social anxiety disorder (SAD) is strongly associated with cannabis use disorder (CUD): SAD co-occurs with CUD at a doubled rate compared to other anxiety disorders and teens with SAD are seven times more likely to have CUD in early adulthood (Buckner, 2018). It appears that cannabis use has marked effects on users' social experience of themselves and of others. It can be assumed that those who suffer from depression or various types of anxiety will struggle in other domains of life, thus their drug use and associated mental health issues are interrelated with their overall functioning. In 2018, a large Canadian study found chronic marijuana users to have more

problem behaviors like ADHD, oppositional-defiant disorder, and conduct issues throughout young life and more depressive symptoms in young adulthood (Ames, 2018). Additionally, cannabis use insights a considerable increase in risk of major depression disorder and bipolar disorder and the risk of “any mood disorder” increases more drastically in weekly and daily users compared to less frequent users (De Graaf, 2007). Although various forms of treatment for mood and anxiety disorders have been developed in recent decades, it is understandable that any mental disorder can be particularly detrimental to one’s academic and occupational goals and social and personal well-being.

SOCIAL OUTCOMES OF CHRONIC MARIJUANA USE

Heavy cannabis users’ drug use influences numerous domains of life including mental health, education, employment, socioeconomic conditions, and social and interpersonal relationships. As discussed previously, incessant marijuana use is associated with antisocial behavior, irritability, paranoia, anxiety and depressive symptoms, and development of mood disorders, traits that may prove detrimental in individuals’ relationships with their community, friends, family, partners, clients, and colleagues (Ames, 2018; Atkinson, 2016; Brook, 2011a; Brook, 2011b; Buckner, 2009; De Graaf, 2007). Socioeconomically, incessant cannabis use is correlated with increased risk of poverty and being unmarried in midlife as well as increased risk for midlife anxiety (Doherty, 2017). Struggles with finances, relationships, and mood disorders may harm users’ ability to construct of a fulfilling, social, and rewarding life. Perhaps most notably, researchers studying trajectories of marijuana use with adult behavioral and personality outcomes find that pathways involving chronic marijuana use are strongly correlated with a distinct increased risk for reduced life satisfaction (Brook, 2011a).

In terms of marriage, regular cannabis users are simultaneously less likely than others to be married and live with a spouse and more likely to engage in frequent arguments with partners and experience low marital and partner satisfaction (Brooks, 2011a). Similarly, relationships with considerable discrepancies in marijuana use between partners are associated with lower relationship satisfaction, increased conflict, negative social interaction, and decrements in perceived partner responsiveness (Derrick, 2018). A study released in 2011 finds evidence for an associative relationship between emerging adulthood marijuana use and relationship quality and satisfaction well into later life. The authors report that marijuana use explained the variance in relationship satisfaction, cohesion, harmony, and disagreement to a great degree (Brook, 2008). Thus, cannabis use clearly has detrimental effects on intimate relationships. The underlying mechanisms of marijuana use and poor relationship outcomes include flawed emotional development, impaired relational development, reduced ability to relate and empathize with others, mental health issues, and potential amotivational syndrome (Brook, 2008).

Unsurprisingly, regular cannabis users have an increased likelihood of having partners who also engage in marijuana use (Brook, 2011a). Perhaps surrounding themselves with people who will confirm their beliefs, share their priorities, and partake in drug use helps users secure their beliefs and find much needed acceptance. Particular social behaviors and personality traits common in chronic users may also contribute to adverse interpersonal outcomes. According to Ansell, 2015, marijuana users demonstrate increased impulsivity and interpersonal hostility, meaning they are more likely than non-users to readily perceive hostility in others and behave aggressively (Ansell, 2015). The hostility in and of itself may be a powerful deterrent to the nourishment, progression, and attainment of friendships and relationships.

A 2016 experiment studying the daily negative and positive effects of marijuana use unearthed intriguing relationships between cannabis and mood. In this study, positive affect was described as feelings of excitement, interest, pride, strength, inspiration, enthusiasm, alertness, determination, attention, and activity. Negative affect encompassed feelings such as upset, fear, shame, distress, hostility, irritability, guilt, nervousness, and anxiety. The researchers found an association between marijuana use and greater daily negative affect in depressed individuals (Griffin, 2016). This indicates that in vulnerable populations with preexisting mental health issues, marijuana has a markedly more powerful negative effect on social outcomes. Additionally, using marijuana to cope with psychological distress, a growing phenomenon among emerging adults, is associated with negative affect, depressive symptoms, and anxious arousal and using cannabis to cope with emotional issues is associated with emotional dysregulation and social anxiety symptoms (Anderson, 2015). In relation to mood disorders and interpersonal difficulty, chronic users are more likely than less frequent users and non-users to have anxiety, depression, and interpersonal difficulties (Brook, 2011a; Buckner, 2018). There is increasing evidence for the association between incessant marijuana use and the development of psychotic and mood disorders (Ames, 2018; Atkinson, 2016; Brook, 2011a; Brook, 2011b; Buckner, 2009; Doherty, 2017; Gilman, 2015). Numerous studies confirm that social functioning such as social network size, frequency of social activities, frequency of interpreted social support, feelings of loneliness, social disability, and affiliation, are significantly impaired in patients with anxiety and depressive disorders (Aghajani, 2017). Therefore, it can be reasonably assumed that heavy marijuana users, who are predisposed to suffer from a range of social disorders, are more likely, by default, to struggle in social contexts and within interpersonal relationships. If regular marijuana use can have such profound effects on one's mental health, it is unsurprising that their educational success would also be threatened.

EDUCATIONAL OUTCOMES OF CHRONIC MARIJUANA USE

Researchers studying the role of marijuana use on educational outcomes find that compared to nonusers and occasional users, frequent users have significantly more behavior issues, lower high school grades, and the least likelihood of enrolling in a college or university (Homel, 2016). Adolescents who frequently use marijuana are at a high risk of dropping out of high school and failing to enroll in postsecondary education (Homel, 2016). While occasional marijuana users display identical high school academic performance and rates of enrollment into postsecondary education as nonusers and generally do not experience the full range of disadvantages suffered by frequent users, they were nonetheless significantly more likely to delay enrollment and had higher rates of dropping out of postsecondary education than nonusers (Homel, 2016). Analysis of national epidemiologic data finds that those diagnosed with marijuana use disorder are statistically more likely to delay enrollment in college and drop out of postsecondary education (Aria, 2015). Marijuana use is associated with oversleeping, missing classes, and effects on working memory and attention (Ashenhurst, 2017). Additional studies confirm that frequent marijuana use predicts college students' failure to attend classes and note an association between this drug use and a negative decline in GPA, even when the potential influence of other covariables are held constant (Aria, 2015). According to Homel, 2016, chronic cannabis use is also associated with delayed graduation from postsecondary education (Homel, 2016). This may be due to users' tendency to prioritize their drug use over academics. A recent 2017 study observing freshman year drug use and adulthood trajectories reports that delayed

college graduation predicts lower odds of reaching various young adulthood milestones such as living independently, purchasing or selling a home, attaining a graduate degree, and most notably, income level (Ashenhurst, 2017). Clearly, the frequency of marijuana use is directly related to poor educational performance, delayed graduation, lower GPA, and incompleteness of school, negative effects likely to linger throughout one's progression through life and restrain chronic users' in a wide range of their future endeavors.

OCCUPATIONAL OUTCOMES OF CHRONIC MARIJUANA USE

Multiple researchers have found an incriminating, direct association between adolescent and young adult regular marijuana use and numerous adverse occupational outcomes. A research article published in 1999 notes that regular, long-term marijuana users often demonstrate difficulty or inability to assume, maintain, and successfully handle adult roles (Brooks, 1999). The authors note that chronic marijuana users generally display "role incompatibility" with conventional societal roles including marriage, education, and employment and typically earn lower grades, fail to complete their education, suffer higher rates of unemployment, earn significantly lower incomes, and experience a high prevalence of employment instability (Brook, 1999). A variety of more recent research confirms these conclusions. Generally speaking, chronic marijuana use is associated with greater risk of unemployment compared to abstainers (Brook, 2011a). A recent study published in 2019 reports that cannabis users experience poorer occupational standing, reduced income, and higher debt than less frequent and nonusers (Ames, 2019). According to Hara, 2013, chronic users are found to be less occupationally productive than others (Hara, 2013). Their lower productivity may contribute to cannabis users' lower income and employment instability. Research finds that adolescent users have a lower income at midlife and are twice as likely as less frequent and nonusers to be poor by age 42 (Doherty, 2017). Clearly, heavy cannabis users experience less desirable socioeconomic outcomes. Chronic use is also associated with delinquency and rebelliousness, traits that seem unlikely to suit an employment environment and might be partially responsible for users' employment instability (Brook, 2011b). Furthermore, heavy marijuana users are more likely to exhibit antisocial behaviors, including violation of and disregard for others, irritability, aggression, and delinquent behaviors. Many researchers have noted that heavy and increasing marijuana users often have unconventional personality traits, adverse psychosocial outcomes, and maladaptive family relations in common (Brook, 2011b). There is reason to believe that irritable, aggressive, negative, and antisocial users may be at a disadvantage in comparison to non-using academic and occupational competitors whose emotional states are not clouded by drug use. Finally, data suggests a significant association between chronic marijuana use and criminal behavior (Brooks, 2011a). Criminal behavior is particularly problematic in terms of attaining and maintaining employment and general career progression. It is reasonable to assume that individuals exhibiting persistent antisocial behavior, criminal behavior, and reduced productivity are less likely to perform well and function productively and smoothly in a work and social environment.

CONCLUSION

In light of passionate accolades of the medicinal powers of cannabis and nationwide efforts to legalize marijuana, the controversy surrounding this drug has crescendoed into widespread, national tension and heated political conflicts. The majority of users do not become

clinically addicted to marijuana; however, studies find that marijuana dependence and cannabis use disorder are legitimate conditions, presenting themselves most notably in regular marijuana users who began use in their adolescence. Cannabis legalization poses numerous clinical benefits; however, marijuana is not a harmless drug and mindfulness of use, addiction, and overuse is crucial in proper regulation. While this essay does not aim to demonstrate a political leaning in either direction of the marijuana legalization issue, thorough consideration of the harmful effects of long-term marijuana use is crucial in the decisions regarding regulation and treatment. Scientists find evidence for the association between chronic, recreational marijuana use and incompatibility with assuming adult roles such as completion of education, sustainment of employment, nourishment of relationships, regulation of emotions and behaviors, and emotional, psychological, and social development. In a time where marijuana is one of the most commonly used illicit drugs and its perceived harm dramatically declines, it is imperative that the scientific findings concerning chronic marijuana use are distributed among professionals, educators, and all communities before the detrimental effects of long term use overpower the young, marijuana-using generation and restrain them from reaching their academic, occupational, and personal goals.

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