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Adverse effects of marijuana use

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Marijuana has consistently been reported as the most commonly used illicit substance in the United States each year. Currently, the legalization of marijuana is up for debate across the nation. While marijuana use is prevalent among the adolescent population, research has shown that there can be devastating effects on health and well-being. A review of the literature shows that marijuana use can have a negative impact on physical health, psychological well-being, and multiple psychosocial outcomes. Adolescents who used marijuana more frequently and began using marijuana at an earlier age experienced worse outcomes and long-lasting effects.

Lay Summary: *This article reviews recent literature regarding adverse effects of marijuana use. Negative effects of marijuana use relating to physical health, psychological well-being, and outcomes such as academic performance are discussed, especially in relation to the adolescent population.*

Keywords: Marijuana, Cannabis, Drug dependence, Addiction, Outcomes

The legalization of marijuana is presently a hot button issue in the United States, and it is no question that the effects of marijuana use are being highly researched worldwide. According to the “Monitoring the Future” 2014 survey results from a large sample of high school students in the United States, marijuana use was found to be the most commonly used illicit substance with 35.1 percent of high school seniors reporting use in the past year. Roughly two-thirds of high school seniors reported not considering regular marijuana use to be harmful, despite much research that has proven otherwise (Miech et al. 2015). Volkow et al. (2014) found that about 12 percent of people over 12 years old had reported marijuana use in the past year, with especially high rates of use among youth. Marijuana has been found to be an addictive substance with increased chances of addiction for those who begin using as teenagers and especially among those who smoke marijuana daily

(Volkow et al. 2014). Undoubtedly, the most concerning issue regarding recreational marijuana use are the numerous adverse effects impacting adolescent youth and those effects that may lead to long-term consequences for development. Marijuana use has been associated with increased risk of motor vehicle accidents, health problems, psychiatric symptoms, and poorer educational outcomes (Hall 2009). Marijuana is also commonly referred to as the ultimate “gateway drug,” leading to increased chances of using other illicit substances (Hall 2006). These adverse effects can be extremely harmful to the health, safety, and emotional well-being of the nation’s youth (see Table 1).

PHYSICAL EFFECTS

While marijuana use has not been found to have any significant acute respiratory

Table 1 *Adverse effects of marijuana use in descending order of severity*

Severity	Adverse effects
1	Induced respiratory problems
2	Psychiatric symptoms and disorders
3	Impaired executive functioning
4	Impaired processing speed
5	Lower academic achievement
6	Poor job performance
7	Impaired social functioning in relationships
8	Impaired driving ability
9	Increased chances of other illicit drug use

effects, regular marijuana use can induce respiratory problems in the long term. The action of smoking marijuana has been found to increase risk of airflow obstruction, bronchitis, and airway injury such as edema (Tashkin et al. 2002). A review by Tashkin et al. (2002) indicated an association between regular marijuana use and symptoms of bronchitis, which included cough, sputum production, and wheezing. Additionally, regular marijuana use can lead to dysregulated growth of bronchial epithelial cells, and marijuana smoke contains carcinogens and co-carcinogens, all of which may play a role in the development of respiratory cancers.

PSYCHOLOGICAL EFFECTS

Marijuana has frequently been linked to psychiatric symptoms and disorders such as schizophrenia; however, it is up for debate as to whether there is actually a causal relationship (Burns 2013; Arseneault et al. 2004; Hall 2006). Cross-sectional surveys from a worldwide sample found that rates of marijuana use are about twice as high for those with schizophrenia than those within the general population (Arseneault et al. 2004). A review of multiple studies by Arseneault et al. (2004)

examining the effects of marijuana use on schizophrenia diagnosis found that self-reported heavy marijuana users at age 18 were much more likely than non-users to be diagnosed with schizophrenia later in life; however, this effect was not as significant when controlling for users who already had a psychiatric diagnosis. These results suggest that marijuana use does not cause schizophrenia or psychotic symptoms, but rather may increase the likelihood of developing schizophrenia in individuals who are already predisposed to psychosis. In contrast, several studies reviewed by Arseneault et al. (2004) found that adolescents using marijuana and adolescents meeting for cannabis dependence were more likely to develop psychosis, even when controlling for the presence of prior psychotic symptoms. Another factor identified was that lifetime history of marijuana use reported at baseline was a better risk indicator for psychotic symptoms than marijuana use reported at follow-up. In several cases, early marijuana use was more strongly associated with psychotic symptoms. Although it is difficult to distinguish whether marijuana use or the manifestation of psychosis precedes the other, it can be determined from these reports that marijuana use has an influential role in the development of psychiatric symptoms.

COGNITIVE EFFECTS

Marijuana use has been linked to impaired cognition with long-lasting effects, especially for those who begin using during adolescence (Jager and Ramsey 2008; Meier et al. 2012; Winward et al. 2014). Meier et al. (2012) studied a longitudinal cohort from birth to age 38. Subjects were surveyed at several time points from ages 18 to 38 and those with the most persistent marijuana use had IQ

declines averaging eight points. The greatest cognitive impairments were found to be in the areas of executive functioning and processing speed. In support of this finding, informant reports noted that individuals at age 38 with persistent marijuana use demonstrated more problems with attention and memory. Overall, earlier-onset marijuana users became more persistent users and saw the most cognitive impairment. Adult-onset marijuana users showed no significant decline in IQ. Even further, adolescent-onset marijuana users who stopped their use did not fully regain neuropsychological functioning upon use cessation. Expanding on these findings, a study by [Winward et al. \(2014\)](#) found that adolescents aged 16 to 18 who were regular marijuana users showed poorer inhibition task accuracy, cued verbal memory, and psychomotor speed compared to non-users when controlling for academic performance levels prior to the onset of substance use. These effects were more pronounced for adolescents who had more lifetime use of marijuana and for adolescents who began using marijuana at an earlier age. Adolescents with histories of heavy drinking as well as regular marijuana use were also found to have poorer working memory skills when compared to the control group of non-users. Taken together, these findings show that regular marijuana use has detrimental effects on cognitive ability in youth, especially for those who begin using marijuana early on or who have been using marijuana over a longer time period. Consistent with the literature, a study by [Thames, Arbid, and Sayegh \(2014\)](#) found deficits in multiple domains of cognition including attention and working memory, processing speed, and executive functioning in recent marijuana users. These impairments were larger in those who used marijuana more frequently within the past four weeks and in those who used a larger amount of

marijuana daily. Furthermore, past marijuana users were also found to have significant deficits in executive functioning compared to non-users, supporting the theory that cognitive function is unable to be regained despite marijuana use cessation. These newer findings contradict a study by [Pope et al. \(2001\)](#) that had found no significant deficits on memory tasks in heavy marijuana users after a 28-day abstinence period compared with controls.

PSYCHOSOCIAL EFFECTS

Along with increased vulnerability to health problems and poorer cognitive functioning, recreational marijuana use has been found to negatively impact psychosocial outcomes as a whole. [Palamar et al. \(2014\)](#) examined multiple self-reported psychosocial outcomes through the "Monitoring the Future" survey within several annual cohorts of high school seniors in the United States who used alcohol and marijuana. Findings supported the aforementioned adverse effects of impaired cognitive and psychological functioning. Additionally, marijuana use was correlated with lower academic achievement, job performance, driving ability, and social functioning in relationships. Similar to previously mentioned findings, these detrimental psychosocial outcomes increased significantly with frequency of marijuana use. Interestingly enough, marijuana users were less likely to report problems related to their substance use compared to alcohol users despite the established negative impact on a wide array of psychosocial factors. In total, 14 percent of marijuana users surveyed reported experiencing no adverse effects. When considering gender, alcohol users had more significant gender differences compared to the marijuana users. Generally, females reported less energy, more

emotional instability, and more psychological problems in comparison to males.

PSYCHOMOTOR EFFECTS

With regard to the impaired driving ability, a meta-analysis of sixty-six studies by Elvik (2013) found that there was an increased odds ratio for getting into an accident when subjects were under the influence of marijuana; however, a causal relationship could not be determined. A review by Neavyn et al. (2014) showed agreement among multiple studies that recreational marijuana use negatively impacts psychomotor functioning including coordination, motor performance, and reaction time, which are all crucial tasks when driving a vehicle. The additive effect of marijuana use, impaired cognition, and reduced psychomotor skill can result in a dangerous situation for individuals behind the wheel as well as the other drivers on the roadway.

As discussed, recreational marijuana use has numerous adverse effects, inclusive of but not limited to, impaired physical, psychological, cognitive, and psychosocial functioning. These effects have been found to be present in youth, and as the research has shown, these impairments are typically long lasting. Adolescence is a crucial life stage during which individuals transition from childhood to adulthood. The slightest disadvantage in any area of functioning can set youth off the pathway to future success. Cognitive ability is a necessity for adolescents as they prepare for standardized testing, entry into further education, and professional roles. Mental stability is also imperative for adolescent youth. Additionally, outcomes such as impaired social relationships and psychological functioning can harm protective factors such as self-esteem and resilience. In conclusion, marijuana use has a

disadvantageous impact on the individual which worsens with earlier and more frequent marijuana use and persists into later adulthood. Future research should examine potential causal relationships of marijuana use on well-being as well as the specific biological and neurological effects of marijuana use within the adolescent population in order to better target marijuana use prevention, treatment, and strategies to reduce long-term deleterious effects.

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BIOGRAPHICAL NOTE

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