

# UC Merced

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Literature Review: Rescheduling of Marijuana

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Undergraduate

# Rescheduling of Marijuana

By Felipe Venegas

Medical marijuana legalization has become both a medical and legal issue. Papers range from casual discussion, passionate and involved such as those by Annas<sup>1</sup> and Okie<sup>2</sup>, to serious logical argument exemplified beautifully in Cohen's<sup>3</sup> work. Annas<sup>1</sup> and Okie<sup>2</sup> focused on California's 1996 medical marijuana law and the 2005 Supreme Court trial *Gonzales v. Raich* respectively. Cohen<sup>3</sup> had a larger scope, reviewing marijuana's history in the United States from the colonial era to present-day. While the former sources made mention of some valuable scientific evidence, they did so amidst a great deal of personal appeal and anecdotes about those affected. Quotes from doctors, talking about their personal recommendations for patients to use marijuana, and, admittedly, evocative statements from politicians or newspapers frame the discussions. For instance, Annas quotes a Boston Globe writer's question asking that if legalizing medical marijuana would send the terrible message to children that "If you hurry up and get cancer, you, too, can get high?"<sup>1</sup>. Cohen's argument did not lack pathos, but he presented his opinion in a strong logical argument, clearly referencing medical findings. All three papers argued, presuming that sufficient medical evidence exists to prescribe marijuana. They, instead, focused on the issue marijuana's legality, rather than on analyzing the validity of the cited data.

Drug abuse and dependence are important considerations for both FDA and Congressional policymakers. While marijuana is relatively non-addictive, especially

when compared to FDA-approved opium, cocaine, and methamphetamine, it remains the most abused drug in America.<sup>4</sup> The authors of “Medical marijuana laws in 50 states: Investigating the relationship between state legalization of medical marijuana and marijuana use, abuse and dependence” analyzed use, abuse, and dependence statistics across the U.S. to measure variance caused by marijuana’s legal status.<sup>4</sup> They concluded that rates of addiction, abuse, and dependence did not vary with overall use, but did not develop the idea much further. To expand upon the study the authors could have spent more time discussing why use rates varied with legality. The authors also could have discussed the consequences of the observed use, abuse, and dependence rates and how they should concern or placate readers.

While ample research has been done on the cannabinoids thought to give marijuana its medical value, not all results have been conclusive or widely accepted. “Endocannabinoids in nervous system health and disease: the big picture in a nutshell” provides a broad yet detailed overview of the endocannabinoid system, which is the biochemical pathway that *delta-9*-tetrahydrocannabinol (THC, the primary psychoactive molecule found in marijuana) and other cannabinoids act upon.<sup>5</sup> Some of the sections within this article require more than a casual knowledge of biochemical pathways, or at least their terminology, to follow. Though it occasionally delves into deeper discussion of biochemical pathways, the paper is not too difficult to follow and certainly delivers a “big picture in a nutshell.”<sup>5</sup> Borgelt, Franson, Nussbaum, and Wang<sup>6</sup> and the Harvard Mental Health Letter article “Medical marijuana and the mind”<sup>7</sup> put an emphasis on the pharmacology of marijuana and discuss both the current drug delivery methods and the side effects. These two articles<sup>6,7</sup> differ drastically in their tone, however. Borgelt,

Franson, Nussbaum, and Wang<sup>6</sup> discuss, in detail, the mechanisms by which marijuana elicits its effects. “Medical marijuana and the mind”<sup>7</sup> lists the effects of marijuana and discusses the drugs that contain THC, but doesn’t delve into the pharmacokinetics. Unlike most papers, emphasis was placed upon findings that indicate marijuana may increase psychotic episodes in those with schizophrenia and bipolar disorder. The debate on these findings continues to this day without a clear consensus. The author refrains from discussing precise biochemical pathways in favor of discussing the consequences of each mode of delivery or side effect. By keeping avoiding technical terms when possible, the author achieves a casual tone capable of reaching out to a broad audience. Both “Medical marijuana and the mind” and “The pharmacological and clinical effects of medical cannabis” agree that smoking constitutes the largest barrier to marijuana’s acceptance within the medical community.<sup>6,7</sup> Should a viable alternative be developed, marijuana could become legal once again. With the exception of Cohen<sup>3</sup>, these two articles<sup>6,7</sup> have the most balanced discussion of both the pros and cons of medical marijuana in its current state.

Increasing amounts of research have been performed on the effects of marijuana smoke and ways to replicate its efficient drug delivery without its harmful side effects. Owen, Sutter, and Albertson<sup>8</sup> look exclusively at the harm of marijuana smoke on the lungs as it compares to tobacco smoke. They found that, like tobacco smoke, marijuana smoke increases the risk of “pulmonary symptoms such as wheeze, cough, and sputum production.”<sup>8</sup> However, it may not lead to chronic obstructive pulmonary disease.<sup>8</sup> Somewhat confusingly, the paper also discusses marijuana’s effect on the immune system and cancer cells, which doesn’t seem to be directly related to the title of the paper.

Though they explain how marijuana smoke can harm the lungs quite thoroughly, there are often departures into less closely related subjects such as the immune system. As a result, it sometimes feels as though the paper is about the endocannabinoid system as a whole, rather than how marijuana smoke affects the lungs. Hazekamp, Ruhaak, Zuurman, Van gerven, and Verpoorte<sup>9</sup> decided to analyze the dosage delivery of the “Volcano” vaporizer. Vaporizers attempt to circumvent the harm of smoke during marijuana inhalation by boiling the THC and cannabinoids into a vapor without actual combustion, which produces most of the harmful particles in smoke. The study discovered that the vaporizer delivered similar amounts of THC as traditional smoking, but with less variance. They state that they used one of the multiple heat settings on the device because, by their calculations, it was the most efficient. Not all users may be able to tolerate that temperature setting, so it would be worthwhile to see if the delivery method remains passably effective at other settings. The examiners pointed out that they only studied THC delivery and, while this is the most studied and well understood cannabinoid present in marijuana, it may not be wholly responsible for marijuana’s therapeutic effect. Consequently, research comparing the delivery of the other compounds is necessary.

Uritsky, McPherson, and Pradel<sup>10</sup> ran an online survey of hospice workers to determine attitudes towards medical marijuana in the industry. While they found that a majority of responders support medical marijuana, they highlighted several potential flaws with their own research. They only surveyed workers for one company, which may attract employees with particular viewpoints based on its policies. Because the survey was run through a website, responders could have submitted answers multiple times by using different computers. Additionally, a high proportion of workers are either

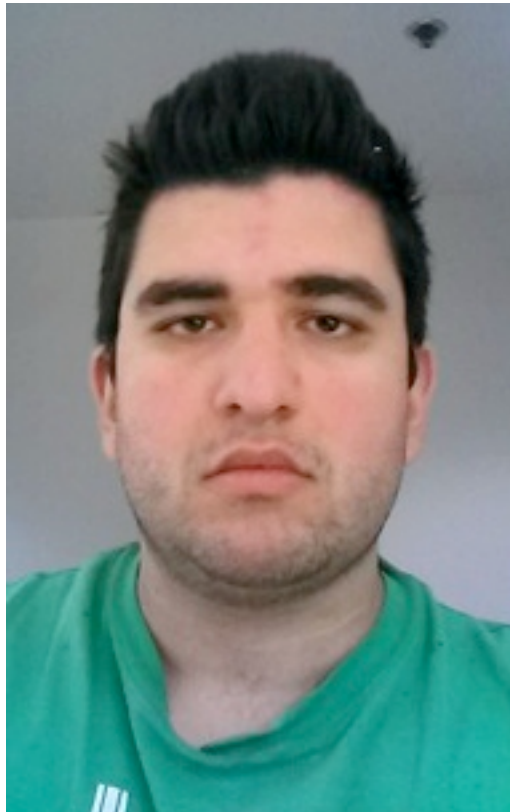
volunteers or unlicensed, so their support might be simple personal opinion rather than the result of research and knowledge about the issue. The questions in the survey seemed appropriate for what the researchers sought to discover. Perhaps the imprecision of survey-taking, in general, caused more problems than anything the researchers did.

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Felipe Venegas graduated from Jesuit High School of Carmichael, California 2010. Before coming to Merced, he was a Life scout in Boy Scout troop 237 of Folsom, California and held a summer position as a student assistant for the IT branch of Employment Development Department. Currently in his senior year, he is working towards a degree in human biology with plan to eventually move into nursing. His pastimes include playing League of Legends and leading the top Horde raiding guild on Icecrown-US in World of Warcraft.

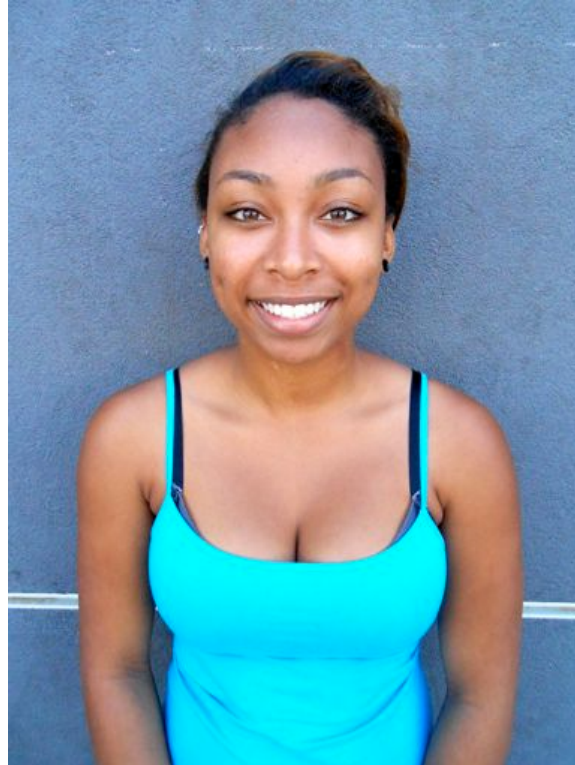
## *The Editors*



Currently a Lecturer for the Merritt Writing Program at the University of California, Merced, Dr. Iris Ruiz has a PhD from the University of California, San Diego. Her dissertation is titled, “Shattering Glass Mirrors: A Case for Historiographic Theory in the Composition Classroom”. Her current interests include: First Year Composition and Critical Pedagogy, Advanced Writing Curricula, Critical Historiography, Latino/a Literature, Historical Rhetorics of Conquest and Transcultural Rhetorics. She is also the current Lead Editor of the University of California, Merced Undergraduate Research Journal.



Tony Hua is a 4th year, Economics major with minors in Writing and Applied Math. Before moving to Merced, Tony grew up in the city of El Monte, a suburb of Los Angeles. Tony is often critical and skeptical, believing that one should never be complacent with their beliefs. This perspective has inspired him to continue his education by pursuing a doctorate degree in Economics, so that he may continue learning more about the world through research. His research interests include Internet markets, match theory, and Industrial Organization. Outside of academia, Tony likes to entertain himself with discussions about the philosophy of science, epistemology, creative writing, and computer games. As an avid gamer, Tony has spent a substantial amount of time thinking about them, writing and designing concepts in his spare time. He likes to frequent the local grocery store when trying to develop an idea, whether it is academic or trivial.



Imani Mauzon is a Political Science Major at the University of California, Merced with a knack for competitive and rational argumentation and debate. Being the first in her family to attend a four-year University, Imani has learned to make huge steps in her life to pursue her goal in doing Political Journalism and Broadcasting. Inspired by her grandfather, Imani was always to be on her toes for any political question or comment he would throw at her while he watched his favorite political news stations. This made her interest in the area both fun and created memories that she will forever have while pursuing and achieving her career. Nevertheless, Imani enjoys spending her free time participating in Mock Trials, and shadowing lawyers and journalists in the Bay Area. Her very opinionated perspective and words make her perfect for not only her future profession, but also for the University of California, Merced Undergraduates Research Journal.



Brianne A. Tate is a third year undergraduate student at the University of California, Merced pursuing a bachelor degree in sociology. She comes from Victorville, California to the more rural town of Merced to experience a different type of atmosphere. Her love for children and personal experience of being placed into foster custody made the career choice of a child and family social worker suitable. She was adopted at birth and luckily placed in a home with a loving, caring, and supportive family, which not too many children can say. This experience has tremendously motivated her to continue on her path in pursuing her career dream of a family and child social worker as well as her fondness for children. Brianne enjoys spending her free time babysitting her younger cousins, admiring their innocence and creativity. She loves children and would love to help them by placing them in the best environment possible for them to succeed just as she was. Beyond academics, she takes part in the Colleges Against Cancer club to support cancer awareness and research. From this journal, she hopes to gain more social communication skills as well as improve her writing.



Thalinna Fuentes is a fourth year and a Literature and Cultures major with a minor in Writing at the University of California, Merced. She has been working for food services at the Yablakoff Dining Center on campus and is going on her second year as a worker. She has also had personal interest in being a part of an on campus Christian ministry called Chi Alpha since she was a freshman and has found joy in being a more active member as a worship leader for year. She enjoys volunteering and traveling for purposes that include, but are not limited to, involving children. She is a flexible and well rounded social individual who enjoys communicating and meeting new people. In her leisure time she finds between being an undergraduate student and working parttime, she reads, writes, bikes and sings for fun.



Ignacia Chu-Jacoby is a fourth year student at UC Merced pursuing a Bachelor's degree in English Literature with a minor in Psychology. Her interest includes; film, dance, music and classic literary works. Originally from Fresno California, Ignacia is a recent transfer student who has learned a lot about the ins and outs of the college system. As a recent transfer student from Willow International college, Ignacia has gained the passion for education and helping future UC and CSU students with the transitional process for transferring. Being a transfer student, Ignacia has had personal experience with the process. As a result it has driven Ignacia to pursue helping other students who are making similar transitions. She hopes one day to work in publishing as an editor and or journalist. Her main focus is the media. In her free time she likes to spend time with friends, family and creating things such as films and choreography. She hopes one day to combine all of her knowledge in the performing arts and the University system in her career.



Alexander Nguyen is a senior at the University of California, Merced. He was born and grew up in San Jose, California. When admitted into the University, he was pursuing a Bachelor of Science Degree in Management, but decided to major in Psychology and minor in Management instead. Being a first generation American growing up around poverty, he has seen first hand how a successful business can change the community. His mother had opened and closed her business while being overwhelmed with too many tasks at once. In his freshmen year in High School he was a student editor of his school's newspaper, but does not think that applies at the university level. Alexander is in search of an opportunity to learn several strategies that are useful towards a business setting and contribute as much as he can to the communities he's present in. He believes that everyday there is an opportunity to learn something new. Inspiration that has been drawn from the environment has shaped Alexander throughout his life. Completing his degree as a first generation American will be a great honor, privilege, and accomplishment.





In 1835, Samuel Clemens, the man who would later rename himself Mark Twain, was born as Halley's comet passed by the Earth. He died 75 years later in 1910, when the comet returned for its periodic visit to the planet. Aaron Johnson was born in 1986, on a night when Halley's comet again burned in the night sky. Coincidence? No. I think not. Destiny has tapped Aaron Johnson to be the next great American author, but destiny is a fickle mistress and only a fool places all their eggs in one basket. To ensure alternate avenues of success remain viable, Aaron Johnson turned to education, and is currently pursuing a Bachelor's of Science degree in Cognitive Science at UC Merced and holds an Associate's of Science degree in Computer Science from Hawaii Pacific University. Being a scribe by birthright, Aaron Johnson developed a natural affinity for language and an appreciation for character, and was drawn to the field of cognitive science in order to gain insight to the inner workings of the human mind and specifically how language shapes human cognition. Language is the greatest invention developed by humankind, and Aaron considers his lack of adequately acquiring aptitude in a language other than English both a personal failing and a failing of the California education system. After graduating from UC Merced Aaron Johnson intends to pursue a teaching credential.



Sonya Lal is a second year undergraduate Political Science major with a minor in Psychology. She was born and raised in the Bay Area. She is a graduate of James Logan High School, where she was a part of her school's sustainability club, link crew, speech, debate, and spoken word teams. At University of California, Merced, she is a member of the Hip Hop Movement: Spoken Word Branch, South Asian Student Association, affiliated with the American Medical Student Association and is starting her own club called Redefining Beautiful. Aside from academics, she enjoys writing, singing, and performing original music. From this journal, she hopes to better her writing, time management, and communication skills.



First generation student, Natalie Felix, is a fourth year at the University of California, Merced. She came from Bakersfield, CA and has fallen in love with small rural town, Merced. Natalie wants to finish her bachelor's degree in Management with minors in wiring and art. Natalie wants to find inspiration in all the many types of writing that will be submitted to the Undergraduate Research Journal. She also wants to polish her critiques of fellow peers writing. Natalie hopes to find a research opportunity this semester. Natalie volunteers at the Multi-Cultural Arts Center and works with The Management Review. In her spare time she loves to listen to music, read fiction books, and play games.



Ryan Franco is a student at the University of California, Merced in pursuit of a Management degree with a minor in Writing. Ryan's hometown of San Pedro located in the melting pot of southern California has contributed to his unique taste in diversity and an appreciation for craft. Ryan's first exposure to society was community sports as a student athlete at Mary Star of the Sea Elementary, Peck Park, and YMCA San Pedro. Sports allowed him to learn how to take directions and critique in order to refine performance and fulfill expectations. Academic leadership as a student government member in the 8th grade was the next endeavor. This involved broad responsibilities and vague guidelines for execution. As a result, Ryan struggled to perform to the standard that was expected. This led Ryan to involvement in cultural clubs and organizations in High School, more specifically Filipino culture. Through this experience Ryan was able to refine his social engagement skills in a setting that balanced both work and play. The last significant experience that further refined Ryan's overall skills as a leader and team player was dance. Through this experience, Ryan was able to learn the concept of art and the execution of a performance or task with grace along with a sense of a self-defined standard of excellence. All of these experiences have accumulated and developed Ryan's eye for inspiration, passion, and awareness. He is open to all opportunities as a result and feels that there is beauty and chaos in all corners of everyday life. Ryan feels that he has a great understanding in the concept that beauty is truly in the eyes of the beholder.



As publicist, editor and marketing director for the witty online buyer's guide, MapMerced, Jonie is also the graphic designer for UC Merced's Undergraduate Research Journal. Prior to the journal, Jonie has worked closely with associates of Merced SunStar and Downtown Life Magazine in networking as well as advertising. No stranger to the world of commercial work, Jonie only hopes to offer what the research journal deserves, the best. As the baby of the Universities of California, UC Merced has impressively turned heads with their research. Upon her arrival in Merced, Jonie had not only strived to make a name within her school, but to make a name for her school. And in accordance with her personal aspirations, she implores how "it is paramount that the university's Undergraduate Research Journal is not only good, but prominent above the rest".