



Spring 2022

Cannabigerol causes a CB1 receptor-dependent reduction in food consumption and weight gain

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Recommended Citation

Jones, Jack and Kaplan, Josh, "Cannabigerol causes a CB1 receptor-dependent reduction in food consumption and weight gain" (2022). *WWU Honors College Senior Projects*. 618.
https://cedar.wwu.edu/wwu_honors/618

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As my time at Western is coming to a close, it has been a great time for reflection on how I have spent the past 4+ years. What decisions I have made that have resulted in where I am today. I came to WWU for the in-state tuition, the natural environment, my early acceptance, and its hippie reputation. When I came to WWU I had little knowledge of what it was that really engaged me, what made me curious. I knew I was good at math in high school so originally, I thought I was going to do engineering. How glad I am now that that was not the case. Being accepted into the honors program blessed me with the opportunity to take Lena Erickson's intro to psychology course near the beginning of my college experience. This class, which emphasized the neuroscience of psychology, helped orient my interests surrounding the mind, human behavior and the underlying neurology of the two. Freshman year was not the easiest and I actually wanted to transfer to Claremont McKenna. I didn't know much about that school besides the prestige the name carried and that it was in California. I think I was in that difficult time where young individuals in a new social and life structure must really take a deeper look at who they are, something that usually isn't that comfortable. I wasn't very satisfied and thought it was because of the university that I was at. I had grown up with my twin brother and though I never would tell him this, I think I often let him make the decisions. It often was easier that way. Now I was faced with decisions like what did I want to spend the next four years doing? What am I actually interested in? Who do I want to spend my time with? These are all questions I will continue to ask myself, but I have begun to discover answers to during the past 4+ years.

The summer after my freshman year, I read Michael Pollen's book, "How to Change Your Mind." Being in college, I had been exposed to what mushrooms were and when I saw my close friend reading that book, it intrigued me. This book gave me a basic understanding of psychedelics, their historical and cultural baggage, their current state in research, and their implications for furthering cognitive neuroscience and psychiatry. Mind you I was reading this book as an 18 year old camp counselor, who was in charge of ten 12 year olds. I felt like I had this forbidden literature in my hands, one that I'm not sure I could fully explain in a mature way if asked by my campers or my bosses. I ended up stealing this book from my close friend, sorry Ryan (I sent her a copy months later) and didn't know what to make of this newfound interest. Podcasts gave me interviews and discussions with researchers and people in the field of psychedelic science. I slowly built up my understanding of the science surrounding the research and was intrigued by the fervor that accompanied the discussions of the potential of psychedelics in psychiatry. I had decided on pursuing psychology or neuroscience at school, it seemed to me that they were an applicable discipline to investigate these substances and the phenomenology accompanying them. But would my parents take me seriously if I told them that this is how I wanted to spend the money that they had saved for me to go to college? Would my friends going to prestigious schools on the east coast think I had really gone off the hippie deep end?

I had been sitting on this internal debate for a while. Thanks to our current drug policy, very few people in my life talked about psychedelics and the experiences that they occasion, despite many of them having significant experiences with them. This made it hard to get advice or open up about this strong academic passion I was feeling. My mom had always insisted that I

find something I was passionate about, not the easiest thing to figure out. I finally had but now didn't know if I should share it with her. I found some insight online, from a man who had been in the field since before the 60's. His advice, published on the Multidisciplinary Association for Psychedelici Studies (MAPS) website, was that because of current policy and detrimental impacts on careers, individuals interested in psychedelics studies must approach it with as much academic rigor and clout as possible. Become credentialed and be wary of the negative impact this might have on your career and life. I was reading this after I returned from studying abroad in New Zealand, during my junior year. I was soon to be accepted into the behavioral neuroscience program and I was invigorated and motivated to do what I wanted to do and follow my interests not matter what current policy stated. It seemed to me that insensible drug policy surrounding these substances was not based on science and that their potential would be impossible for our society riddled with mental health problems to ignore for long. I can't remember how I first told my parents but I'm sure studying the neuroscience of psychedelics was not what they had expected I would be using my BNS degree for.

Following the advice of the man published on the MAPS website, I saw two broad paths toward my interests. A PHD or and MD. These paths would provide the educational background and depth to my understanding to allow me to think critically about psychedelics and mental health. Now to make another decision. I needed to see which of these paths was better for me. Talking to my stepdad, who is a psychiatrist, and his psychiatrist friend who was working with ketamine, I gained some insight into the lifestyle and responsibilities of what an MD could offer. I had also been in contact with Josh Kaplan. I had been asking to be a part of his lab, but on returning from NZ with my interests dialed and ready to grind, I made it clear to him I was looking for lab experience that would allow me to demonstrate my motivation and passion for neuroscience and drug science as well as give me insight into what life might be like pursuing a PHD. Josh offered me the opportunity to investigate a severely understudied cannabinoid, CBG, one with the potential to offer some interesting findings. I called up a friend of mine Finn, who worked in Josh's lab and who also had come out about his passion for psychedelics. He encouraged me to join the lab. We decided that if we wanted to be able to utilize these substances in our post grad lives, we should start spreading awareness of their potential but also about the complete rubbish drug policies that have resulted in our societal misperceptions of drug use, drug users, and drug policy. This led us to found WWU's Chapter of Students for Sensible Drug Policy, an organization committed to harm reduction, peer education, and policy advocacy.

I had gotten some balls rolling. I was now in a challenging and competitive major, one I was passionate about, I was in a lab that was studying the *therapeutic* application of cannabinoids and other constituents of the cannabis plant, and I had founded a club surrounding a topic that was against the status quo of drug policy. Did I mention this was all during the dark ages of Covid? Maybe that helped. It was time to grind and that's what I did. I think zoom world allowed me to start as many things as I did my senior year. It allowed me the flexibility to rearrange me schedule to fit in lab, club, internships, to learn asynchronously, and to travel to Evanston Illinois, where my girlfriend was going to school. It also severely filtered my perception and reality of my college experience. I was at a point where I was ready to be

fully involved and committed to my academic career but could not fully take advantage of being college because I could not adequately develop relationships with faculty and peers. It was only this past year, my fifth year, when I began to comprehend what college could be like and the extent that I had been missing out. During Covid isolation, I joined my lab where I was one of two people that could be in the lab at a time. This is vastly different to what had been. In the past, senior lab members helped onboard and teach skills and techniques to new lab members. By not getting these interactions my first year in the lab I think I was isolated and felt like it was a chore rather than an opportunity. This was partly due to the nature of bench work, biking into lab in the rain by myself at 10am and 6pm to spend an hour plus injecting mice with CBG, and not having a complete understanding of our lab's goals and how I fit into them. Comparing this semi grueling experience to when in person school opened again was night and day. My soon to be close friend Farrell joined the lab and gave me someone to talk to, commiserate with, and double check my work so that I wasn't second guessing myself all the time. It also allowed me to interact with others, giving me insight into their projects and giving me a better sense of the lab goals and how I was contributing to them. It made me excited to be doing lab work with these folks and I was inspired by their life goals and aspirations and how lab was contributing to those. I got a much better sense of why I was doing what I was doing, why my work mattered, and what I was gaining from being a part of this community. Reflecting on my time in lab as it is coming to close, I can recognize how many opportunities it has given me. I got my first publication in a scientific journal, with another on the way. It strengthened and deepened my understanding of cannabis science, with an emphasis on its therapeutic potential rather than adverse effects. I presented at a national neuroscience conference on work that I had participated in. I presented my work at psych fest. And most importantly I had formed a relationship with my P.I. Josh which I will forever cherish. He is mentor who does the most for students, always having their best interests at heart and gives them opportunities that will help them succeed in whatever they do next. His commitment to the BNS major and WWU is evident in the numerous events he presents at, his involvement in creating more opportunities for students, such as the medical internships or becoming my clubs faculty advisor, and the advice and insight he shares with any student who comes through his open door. His unending positivity, patience, and hard work will forever set an example of the kind of person I want to become.

My experience founding and running SSDP had a comparable shift moving from online to in person. The first year of running the club, we had around 20 of our close friends who would show up. This was great but it didn't feel like to me that we were spreading awareness or really generating any new community. We made presentations, collaborated with the UW chapter, and set the foundation for what our chapter stood for and what we would be doing. Moving into in person club happenings was one of my most rewarding experiences of my college experience. I had founded this club and put so much of my time into it because I truly care about spreading awareness of drug science and the harms of drug prohibition and the impacts it's had on our society. Moving into person, gaining a rather large and positive response, and getting to share my passion with so many others who were curious, engaged, and committed made all the long hours creating presentations, scheduling meetings, and doing club paperwork worth it. I met people who were inspired by me and our club to pursue an

academic career in drug science. I got to participate in outreach at local high schools teaching them about the harms of the War on Drugs, policy alternatives, and getting to answer their questions. Since starting the club I had wanted to present to high school students because I recognized the lack of truthful or helpful drug education that I had received at that age. Getting a letter from the classes that we attended saying how much they appreciated our presentation will forever stick with me as one of my greatest accomplishments at WWU.

Besides my extracurriculars I had been chuggin away in my course work. The beginning of my senior year, my advisor Andrea, a true angel of a major advisor, told me I would have to take a whole extra year. I had taken classes past my prerequisites in NZ and then took a quarter off to travel. I had taken a lot of psychology classes my first two years at WWU for my minor because they were fun and interesting. Because of all this I didn't have the prerequisites to apply for the major on time. When it hit me that I was going to have to take an extra year (totally four and two quarters) I was initially frustrated. It was technically my fault because I had taken classes that were interesting rather than the ones I needed to get into the major but I felt disappointed and was seriously considering changing my major to psychology so I could get out "on time". Instead, I recognized an opportunity to be in person for another year and used my extra year to take my medical school perquisites that were not covered in my major. I am very grateful for happening upon the BNS major. It has given me learning opportunities to progress myself and my resume. Besides working in the lab, I was able to participate in a psychiatry internship with a local psychiatrist. I also completed the neurodiagnostic internship. Both opportunities gave me insight into ways to utilize my degree post-graduation, allowed me to shadow physicians in fields of medicine I could see myself in, and allowed me to learn about treatment and diagnostic techniques in a much more personal and involved sort of way. I also have been a part of the Neuroscience Research Driven Students Club (NeRDS) where I volunteered at local elementary schools. I have always enjoyed working with kids and I loved getting to share my passion for neuroscience with these young minds.

Being a reflection paper for my honors project I better mention my involvement with the honors college. The honors program was something I was excited to be a part of coming to WWU. I guess I have always been a bit self-conscious about WWU's academic prestige and I felt that it might help me get involved with others who were driven like me. Living in the Edens dorm greatly influenced my first year at Western. I met a group of friends that would later dissolve but this experience taught me valuable lessons about how good friends treat each other and how I should be treated by people I consider my friends. I learned lessons about loyalty, patience, and compassion. As I mentioned earlier my intro to psychology class through the honors college completely shifted my academic trajectory and who knows where I would be without that experience. Other seminars and colloquiums later in my college career were interesting and engaging but often felt like were taking up space for major classes that I wanted to take. A highlight from my honors curriculum was Tom Moore's class investigating spirituality, a class I related to the meaningful and spiritual experiences that people report from psychedelics. Tom was receptive to my interests, provided beautiful pieces of literature, and questioned me in ways that made me think deeper about what these experiences really meant. I also enjoyed Dr. Neff's class relating technology and society. It was a class that provided a

relief from the onslaught of ochem and biology classes I was taking at the time. Besides these classes I felt that the honors college, its community, and the curriculum were something that I was not really engaged in. Possibly owing to covid, I felt like I was not a part of the honors community. The opportunities and advice that I felt made the most impact from were from Josh Kaplan, self-motivation, and from students who had a similar interest in me. I don't blame the honors program for not making me part of their community, as I was very busy putting my time elsewhere. This left little time to join into book clubs or events hosted by honors. I do think that faculty outreach to students in the honors program could be greatly improved. For fresh college students, an advisor who has insight into opportunities around campus and in departments would be very helpful and might help them with their trajectory. I'm glad I stuck with the honors program, seeing so many of my friends drop out of it, but I do wonder for students in my position with so many classes to take if the honors curriculum might be getting in the way of taking other major specific classes.

I will say, despite being hesitant of the extra work, I really enjoyed having to create my honors project because it was quite rewarding for me to take a step back and consolidate everything that I had done in lab for the past two years into a scientific poster. It was nice to collaborate with Josh and Farrell on a final project and get to watch as our work became a physical professional poster. It forced me to get my spiel down and dive deep into details I had all but forgotten. I enjoyed presenting my work and having the opportunity to have friends and family get to see what I have been working on, giving them insight into my academic life that they haven't really been a part of. It gave me a sense of closure that I was appreciative of. Hearing Josh introduce me at my presentation meant the world to me. This reflection piece, something I did not want to include has helped me recognize how close the end of college is and look back on what the last many years have been for me. It has helped me to look back at my time from the very beginning, seeing the faces of the individuals who impacted my experience. View challenges that seemed too large or daunting to overcome. Decisions that I had to make for myself always with uncertainty. Relationships that I hope will last for rest of my life. Insights into disciplines that I didn't know what they were when I came here. Opportunities to share my passion with others. The discussions of what influences our decisions and hopes and dreams for after this shared time together. There is a blur that accompanies those busy days, hard work, late night study sessions, and I appreciate this last writing assignment which has set aside time and mental energy to look back and collect my thoughts and feelings about my time here at WWU.