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Removing Stigma, Unlocking Potential

“In all things of nature there is something of the marvelous.”

— Aristotle

Natural substances have a great potential to better the way we as humans exist in this world. Throughout recorded history, natural substances have been the lifeblood of all walks of life. The cannabis sativa plant is just another naturally occurring part of our world that has proven to have a large number of uses. Somewhere in history, this plant was deemed dangerous and this stigma placed on it would hinder research for a century.

Scientists, lawmakers and the general public must ask themselves: Should Cannabis sativa Linnaeus remain an illegal drug (marijuana) and heavily restricted fibrous plant (hemp) that forever has a stigma attached to it while more harmful drugs are being abused and more environmentally damaging methods are being used, or should we tap into the very viable medical and agricultural uses of the plant to better society, the environment and the economy?

I began my research of this topic by with developing an understanding of how we got to where we are today. How did the crusade against this extremely useful plant begin? The first real sign of direct government intervention on the marijuana and hemp industry occurred in 1937 with the passing of the “Marihuana Tax Act”. This Act placed taxes on the sale of cannabis and began the first steps to heavy regulation. This Act was meant to regulate and control the funds involved with marijuana and hemp production and sales. However, coupled with these seemingly harmless taxes are sections regarding penalties.

SEC. 12. Any person who is convicted of a violation of any provision of this Act shall be fined not more than \$2,000 or imprisoned not more than five years, or both, in the discretion of the court. (6)

Extreme penalties were written in to this Act and were later used in the effort to alter the public's view of the drug. The fine above is the equivalent of over \$30,000 in today's money and this naturally made farmers wary of growing or importing the product. The Act allowed for the search and seizure of marijuana shipments and started the movement to associate marijuana with criminals. Keep in mind that approximately 100 years before this act farmers were required by law to have hemp fields because of its vast uses.

It is believed by many that this Act, and the war on drugs in particular, is directly tied to a political and business movement to decrease the influence of the hemp industry. **(7)** It all started around 1930 with Harry Anslinger's "reefer madness" campaign. Anslinger was the Director of the Federal Bureau of Narcotics (FBN) and also seen as a front-runner for those that saw marijuana and hemp as a threat to their profits. Hemp was proven to be a better alternative than wood for paper production, but there were many powerful businessmen with hefty stock in timber. A cheaper and more environmentally friendly alternative to making paper would have hurt the investments these companies had already made. Paper, however, was not the only commodity that hemp was imposing on.

Another large revenue-driven product that hemp threatened is the synthetic material nylon. The DuPont family had come out with this new product that was meant to replace hemp as a widely used fiber. These two reasons, paper products and fibrous materials, were the driving factor behind the stigma eventually forced on to the plant. These businessmen began their crusade against the other uses of the plant, marijuana. It was not only marketed as a dangerous drug, but was directly associated with minorities (whom the general public certainly did not care much for at this point in history).

Minorities had already been labeled as the "bad guys" by movements earlier in the century. The "Harrison Narcotic Act of 1914" was made to impose heavy

restrictions and taxes on opiates and coca plant products. This Act is very similar to the one passed in 1937 for marijuana products and was a catalyst to the war on drugs. Opiates and coca plant products were being directly linked to criminals and minorities and the public was lapping it up. This set the stage for the public to be easily swayed the next time taxes and restrictions were placed on a drug that was labeled as abusable.

It would see that the world once again came around with the wonders of the hemp plant during World War II. "During World War II, the federal government launched an aggressive "Hemp for Victory" campaign. U.S. armed forces had relied on abacá, Manila hemp, imported from the Philippines, for rope, canvas, uniforms, and other products. After the Philippines fell to Japanese forces in 1942, the Department of Agriculture and the U.S. Army urged farmers to grow hemp. Without any change in federal law, more than 400,000 acres of hemp were cultivated in the United States between 1942 and 1945, aided by the War Hemp Industries Corporation, which built 42 hemp mills in the Midwest. The last commercial hemp fields were planted in Wisconsin in 1957." **(16)**

In 1961 the United Nations passed a treaty called the 'Single Convention on Narcotic Drugs'. This was a treaty that better defined what the word narcotic meant to the world. This treat was in favor of hemp and made a clear distinction between the different products of the Cannabis plant. Here we see yet another step in the right direction, for hemp at least. I can certainly understand the want or need to regulate a drug such as marijuana. The plant as a whole is what need not suffer because of the potential abuse of an untested drug.

The "Marihuana Tax Act" was deemed unconstitutional in 1969 as a violation of the Fifth amendment (because in order for a person to get the proper documents to sell, acquire or possess marijuana, you would need to effectively turn yourself in to the authorities). It is my thinking that lawmakers knew they no longer had to hide their intentions behind taxation and generating revenue for the nation. The stage was set for a full-blown controlled substances act that would classify and regulate all known drugs.

The "Comprehensive Drug Abuse Prevention and Control Act of 1970" was this

act and it was a huge turning point in the history of the United States and the now official war on drugs (primarily Title II - Controlled Substances Act). **(8)**

The “Comprehensive Drug Abuse Prevention and Control Act of 1970” no longer defined the plant as two separate parts. They now had a new word to lump them both under, ‘marihuana’. "The term 'marihuana' means all parts of the plant *Cannabis sativa*, whether growing or not, the seeds thereof, the resin extracted from any part of such plant; and every compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds or resin." **(21)**

While a guise for the war on drugs was no longer needed, it still existed. The Act had mentions of increasing drug research and rehabilitation for users. If certain drugs had fully been researched there would be a much different connotation associated with them today. If rehabilitation was an interest, users of the drug would not have been labeled as the enemy. Instead, it was more beneficial for businessmen and lawmakers to continue a fight against a nonviolent drug. I can agree that certain drugs should be illegal and regulated. Opiates and coca plant products have been proven to be highly physically addictive and cause severe health problems when abused.

The hemp industry was finally stifled in 1990 with the ‘Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substance’. This treaty further broke the distinguishment between hemp and marijuana. This was meant to restrict when and where the *Cannabis* plant could be grown and was the final step in greatly harming where we are today with hemp production.

“We still do not know one thousandth of one percent of what nature has revealed to us.”

- Albert Einstein

The restrictions in place on hemp and marijuana for so many years have greatly hindered the ability to research the benefits of the plant. In the last several years we have come across a growing number of uses for hemp and more so marijuana. The uses of hemp are well-documented and researched. Allowing hemp to be more easily produced could have many agricultural and economical benefits for society.

Unfortunately, there is a mile of red tape surrounding the production of this entirely harmless resource.

Hemp and marijuana are indeed different species of the same plant (*Cannabis Sativa* Linnaeus), but they still must be discussed together. Hemp does not contain the proper chemical makeup to “get someone high”, yet it still comes with very strict guidelines. Hemp can not be grown by just anyone as it requires special permits with a long list of requirements **(3)**. Hemp fields also have many restrictions placed upon them which make it very difficult for the average person or even commercial farmer to grow and produce. Hemp can easily be a better alternative for many products we use today, but the restrictions in place make the plant very difficult to utilize efficiently.

The permit application process includes large nonrefundable fees, extensive background checks and thorough analysis of the grounds which it will be grown (to ensure proper security measures are in place). The security requirements are as follows: “security fencing around the farm, a 24-hour monitoring system, controlled access, and possibly around-the-clock armed guard(s).” **(3)** As I stated before, this clearly makes farmers quite wary of even starting the permit process. Why would a farmer risk large amounts of non-refundable money when the permit will likely be denied? Even if a farmer did want to pursue the process... they would have to completely change their land to accommodate the requirements.

The hemp plant has many uses that people may or may not realize. It is certainly a ‘marvel of nature’ and it is a shame that the ability to fully utilize it has been crippled by unnecessary restrictions. One of the most widely known uses of hemp are for paper and rope products, but there are others as well that are not often discussed. Hemp can be mixed with other material to create cheaper and safer alternatives for building products such as concrete and fiberglass. It can be used as an alternative for fuels such as biodiesel. Hemp is also quite nutritious and can be used in a wide variety of foods.

Some details about the nutritional makeup of hemp seeds and oil can be found here: “Hempseed oil is over 80% in polyunsaturated fatty acids (PUFAs), and is an exceptionally rich source of the two essential fatty acids (EFAs) linoleic acid (18:2 omega-6) and alpha-linolenic acid (18:3 omega-3). The omega-6 to omega-3 ratio (n6/n3) in hempseed oil is normally between 2:1 and 3:1, which is considered to be

optimal for human health. In addition, the biological metabolites of the two EFAs, gamma-linolenic acid (18:3 omega-6; 'GLA') and stearidonic acid (18:4 omega-3; 'SDA'), are also present in hempseed oil." **(5)** The uses for the plant as food alone should encourage the DEA to lessen the extremely strict guidelines surrounding the production, but this is still only scratching the surface of its potential.

Hemp also has many benefits for the farms it is grown on. For one, it can be planted in the same field many times over without the need to rotate the crop. Furthermore, it leaves behind an improved soil structure when it does have to be moved. Put simply: Hemp benefits whatever crop is planted after it. It is a shame because this plant could benefit farms greatly if a farmer did not have to bend over backwards to even think about hemp production. As stated before, there has been a large amount of research in recent times detailing the agricultural and environmental benefits to hemp farms, and one of the most astonishing uses of hemp is for paper products.

The U.S. Department of Agriculture (USDA) has released studies that definitively prove hemp is a more efficient paper making plant than wood. It is not only cheaper to maintain the fields of crops, but it is cheaper to harvest and requires less land to produce the same amount of paper as wood. You will find the chart and the text detailing the study below **(2)**:

MATERIAL	PULP YIELD	RAW MATERIAL REQUIRED PER YEAR.	ANNUAL GROWTH PER ACRE	ACRES REQUIRED FOR SUSTAINED SUPPLY, FOR 25-TON MILL.	ACRES REQUIRED FOR SUSTAINED SUPPLY, FOR 1 TON OF FIBER PER YEAR
WOOD	2 CORDS YIELD 1 TON FIBER	15,000 CORDS	0.37 CORD (ABOUT 0.55 TON).	40,500	5.4
HEMP HURDS	1TON YIELDS 600LBs FIBER	25,000 TONS	2.5 TONS	10,000	1.33

“The most important point derived from this calculation is in regard to areas required for a sustained supply, which are in the ratio of 4 to 1. Every tract of 10,000 acres which is devoted to hemp raising year by year is equivalent to a sustained pulp-producing capacity of 40,500 acres of average pulp-wood lands. In other words, in order to secure additional raw material for the production of 25 tons of fiber per day there exists the possibility of utilizing the agricultural waste already produced on 10,000 acres of hemp lands instead of securing, holding, reforesting, and protecting 40,500 acres of pulp-wood land.” **(2)**

The USDA has stated that it may become imperative to develop new ways of creating paper products. “... under the present system of forest use and consumption the present supply can not withstand the demands placed upon it.” **(2)** All tests have shown that the paper products created from hemp hurds are just as reliable and tested just as well as products created from wood. On top of this, farmers have been working further to produce hemp with less and less THC (Tetrahydrocannabinol) content and more CDB (Cannabidiol) content. The more CDB there is, the less the THC is effective. You can already “not get high” from hemp, but these new forms of the Cannabis plant are eliminating nearly all traces of THC. This further trivializes the restrictions placed on hemp farms in the United States. I was, however, able to find some disadvantages to hemp production.

The largest disadvantage to the hemp (and specifically the hemp-paper industry) is due to practices that already exist. The disadvantages boil down to the people in charge making business-conscious decisions to not rework the system that is already in place. There are countless wood mills around the country that have specialized equipment and have improved the process of making paper from wood over the last many years. The facilities and processes in place have been custom-tailored to making wood from paper, and hemp would require different tools, different processes and an investment of time and money that no one wants to spend. “Hemp’s long, strong fibres can get tangled up in the beating stage and cause uneven sheet formation. Problems with slow drainage on the paper machine have been reported too, perhaps due to the waxy, water-repellent resins naturally occurring in the fibre. Slow drainage is a

significant problem to the paper industry since it affects production times.” **(9)**.
Ultimately, the restrictions put in place so many years ago are one of the primary reasons the hemp-paper industry will have a difficult time breaking into mainstream use.

“Growing hemp as nature designed it is vital to our urgent need to reduce greenhouse gases and ensure the survival of our planet.”

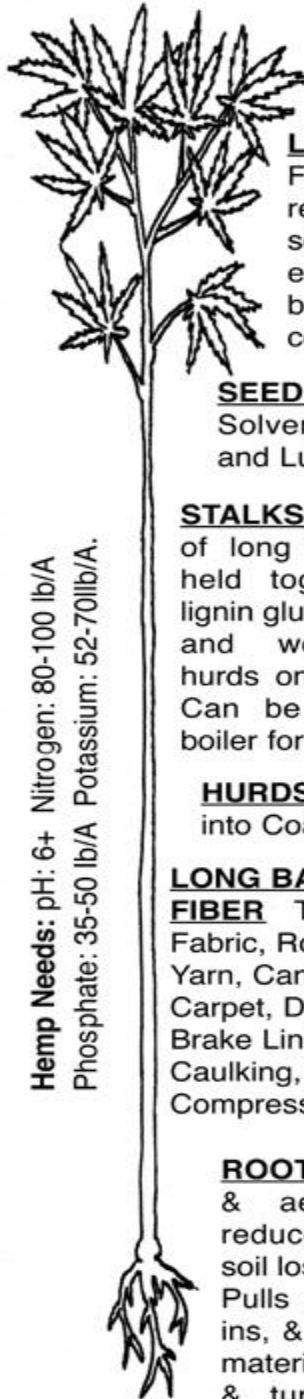
— Jack Herer

The potential of hemp, in my mind, is one of the biggest reasons that the negative connotations surrounding the cannabis plant need to be altered. Many people do not view hemp as a harmful substance. Many people do not associate hemp with criminals. This is only when people think about the end product of hemp itself. Once the topic is brought up that one must cultivate a form of cannabis the ideas of those that are uninformed changes. What these people may not understand is that not only does hemp contain nearly undetectable traces of THC (the component of cannabis that intoxicates a person), but it actually kills the other strain of cannabis (marijuana) when grown near it. It is nearly impossible to grow both strains of the cannabis plant in the same area.

I have tried and tried to find the negative impacts of hemp on the environment and on society, but I simply can not find anything concrete. There are some people that responded to my paper in my peer review stating that industrial hemp farming would negatively impact the environment due to the waste it creates, but I can not find any proof of this whatsoever. In fact, all of the parts of the hemp plant are used and processed for different purposes. I have attached an image on the next page that shows the ways all parts of the hemp plant are used to their maximum potential. **(10)**

Farming Hemp:

Hemp requires 10"-13" of water. Plant 200-300 plants/square meter to shade out weeds. Seeding temp: 42-46F. Germinates within 1 week with warm temperatures and good moisture. Harvest should begin as soon as last pollen is shed. Grows 8-15' in 3-4 mo.



Hemp Needs: pH: 6+ Nitrogen: 80-100 lb/A
Phosphate: 35-50 lb/A Potassium: 52-70lb/A.

HEMP PARTS:

LEAVES

Fall to ground regenerating soil with nutrients. Also bedding and compost.

SEED Also makes Solvent Varnish, and Lubricant.

STALKS Made up of long bast fibers held together with lignin glue on outside and woodchip-like hurds on the inside. Can be burned in boiler for energy

HURDS Also made into Coal, and Paint.

LONG BAST

FIBER Textiles: Fabric, Rope, Twine, Yarn, Canvas, Carpet, Diapers; Brake Lining, Caulking, Paper & Compression molds.

ROOTS Anchor & aerate soil, reduce erosion, soil loss, & runoff. Pulls metals, toxins, & radioactive material from soil & turns it into something useful.

ROTATION CROP Hemp stabilizes & enriches soil, leaves fields weed-free without crop toxins, and doesn't compete for best farmland: Hemp has farm value even if no part of the plant is sold.



FOOD



FEED



BODY



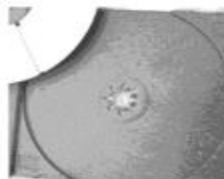
OIL



FUEL

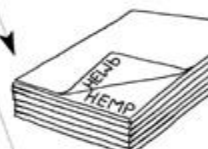


AUTO



new cd case

PLASTIC



PAPER



HOUSES



CLOTH

Hemp can be used in so many ways in everyday life. Hemp seed provides ten essential amino acids, four essential fatty acids, over 30% protein and is easily digestible. Hemp can be used as feed for livestock and gives them the essential protein they require. Other types of feed require antibiotics to digest, but hemp feed does not. As previously discussed, hemp oil can also be used for beauty and body care products.

Hemp oil can be used for various types of paint and sealants. Hemp can be used to replace various composite material. This means it can be used for things such as house paneling or even to replace fiberglass for automobiles. Fiberglass is a terrible dangerous material and the fact that hemp can replace it is a good enough reason alone. It can also be used to replace concrete. It is more flame retardant and can be made to be as strong as concrete. Hemp contains a large amount of cellulose and have the ability to replace plastic. As we know, plastic is hugely wasteful, even with the recycling initiatives that have been sweeping the country.

To recap on the uses of hemp: It can make stronger paper, more easily recycled, and can produce far more paper pulp product than trees with the same amount of space used. Hemp clothing has a large number of benefits over other materials as well. It is a very strong fiber, can be softer than many other fibers, it is warmer than other fibers, and again the waste generated compared to other fibrous plants is less. Hemp fuel is one of the lesser functions of the plant but it is still a very feasible use. The potential for hemp fuel will never be unlocked if the plant continues to be stifled by other industries.

As you can see above, the harmful effects on the environment seem to simply not exist. Hemp is truly one of the most multifaceted plants that exist in our world. Even if you can find some harmful effects in the production of its various materials (such as byproduct, waste, emissions) you will be hard pressed to prove that it is any more harmful than the methods already used. Producing products from hemp is a better alternative for nearly everything that it can create.

Due to the current state of the hemp industry it would no doubt be costly and time consuming to work it back into everyday life. This is the biggest drawback that I can find. There are methods of processing wood, cotton, linen, fiberglass, concrete, fuel, et cetera that are not the same for processing hemp. Bringing hemp back to glory would require overhauls to existing systems, and no one wants to spend the time or money to

do so. I have searched far and wide for other negative impacts of industrial hemp farming and I can not locate anything feasible.

“The illegality of cannabis is outrageous, an impediment to full utilization of a drug which helps produce the serenity and insight, sensitivity and fellowship so desperately needed in this increasingly mad and dangerous world.”

— Carl Sagan

Many people in today's society can read the facts and agree that hemp should be looked in to as a viable and beneficial alternative to fibrous materials. The real controversy of Cannabis Sativa L. is with the other strain that can be produced from it: Marijuana. The war on drugs may have started by business and political agendas, but we should all be able to agree that there are also certain dangers associated with any drug. Marijuana is a drug, but we must determine how harmful it truly is to the human body and society as a whole. This determination becomes especially important when you compare it to fully legal drugs that our society embraces.

Marijuana has many uses and can most certainly be utilized to better the world of medicine and the environment as a whole. Like most things in the world, it can absolutely be abused and cause harm to those that abuse it. As research continues, the harmful effects are being diminished. Some negative effects are easy to spot, such as smoking in general. It is never a “healthy” choice to combust plant matter and inhale the smoke produced, this is an undeniable fact. Other negative effects are with the black market in general. There is a large underground industry that produces and distributes marijuana. The nature of this sort of market is one of violence. All of these negative effects can be lessened by the allowance of further research and accessibility to the general public.

“Our first impressions are generated by our experiences and our environment, which means that we can change our first impressions... by changing the experiences that comprise those impressions.”

There are valid points behind both sides of the argument for/against marijuana. These points are often factual, but other times may stem from personal experience, the experience of those around you, or what one has heard from mainstream media. As discussed earlier in the paper, marijuana has been plagued by a stigma for over a century. The government and media worked tirelessly to make out the drug to be entirely detrimental to society. This was long ago when marijuana was only seen as a recreational drug, but there have since been many discoveries in the usefulness of it.

The medical uses are becoming more and more apparent. At a base level you will see some people using it to relieve stress. These people can drastically have their life changed by embracing the calming effects of the plant. In my experience I have seen people that were on the edge of breakdown be able to reel it in under the effects of THC. On the other side of the coin, I have seen people become more paranoid and stressed under the effects. The drug affects different people in different ways and the more research that is done on it, the more we will know how and why this is.

A glaring problem in the United States is the prescription drug culture. Prescription drugs are largely abused and are rarely frowned upon. Granted no one is siding with the full on opiate junky, but there is more to it than that. Common and successful people are severely damaging their body and mind by being addicted to sanctioned and socially accepted drugs.

One must look at these other substances that are being abused in the world today and then compare them back to marijuana. The government and the general public of the United States largely do not have an issue with absolute abundance of drugs that exist for relieving pain, curbing anxiety and recreation. It is quite ironic how much money has been spent on the war-on-drugs when you look at how the drug-culture of the United States is embraced by many.

Painkillers, muscle relaxers and anti-anxiety pills are highly abundant in suburbia and it is commonplace for adults to be prescribed. Across the country in 'suburbia', much like where I grew up, you would have the over-protective mothers gobbling down their Xanax or Valium while warning about the dangers of marijuana. I never looked at

it as a fault of them necessarily, it is just how the connotations surrounding various drugs played out in their lifetime. These pills were prescribed by doctors and therefore must be okay to use. Granted I can agree that children should not be using any drugs, but these same people would have quickly looked down on any person of any age for using an “illegal” substance, no matter how much more safe it may be.

“Herb is the healing of a nation, alcohol is the destruction.”

— Bob Marley

The next most widely abused, widely accepted and perfectly legal drug across the world is alcohol. Many people will associate getting extremely drunk with delinquency, which is a good thing. Many of those same people, however, do not view casual use of alcohol to be a problem. Furthermore these same people may look at casual marijuana use as delinquency. The double-standard exists, even though the research on dependency and harmfulness shows that marijuana is the more desirable option. I personally think that this is the best drug to draw comparisons with in regards to marijuana. As we know, alcohol went through its own stage of prohibition in the United States for over a decade. There was a time that people in this country saw alcohol as a problem for the morality and general health of the population. This is not to say that people today fully embrace alcohol as a safe substance.

The primary stigma that exists today is in regards to drinking and driving. This is the one thing that can be widely agreed upon as “wrong”. However, it is still perfectly socially acceptable for a couple or group of friends to go out to dinner and have a few glasses of wine. In many cases, at least one of these people will in fact be driving over the legal limit, thus breaking the law and endangering others. There are generally no social issues here unless the person gets pulled over or hurts someone. Meanwhile, someone that uses marijuana in their spare time in the comfort of their own home, not bothering anyone, can easily be seen as a deadbeat. The connotations attached to recreational marijuana use and the way alcohol is viewed is a double-standard that should not be in place. Not only has marijuana been proven more safe and less addictive than marijuana, it is also a nonviolent drug. You won’t be likely to see a bar

fight with people under the effects of (even large amounts of) marijuana. Fortunately, with the medical, environmental and economical discoveries of marijuana coming to light, the public is coming around to help relieve the stigma.

As previously stated, there are no doubt downsides to marijuana abuse. We can begin with the negative health effects. The main and obvious reason it negatively impacts health is via the primary method of consumption: smoking. While not nearly as dangerous as cigarettes, any time you are combusting plant matter and inhaling the smoke it is not “healthy” for you. This is the one very much agreed upon negative impact of marijuana. Luckily, with research and testing, there are many other ways to consume it that are far less detrimental to one’s health, but I will get to those a bit later.

First I would like to point out the laboratory-created pills. The drugs ‘dronabinol’ and ‘nabilone’ are pills based on the chemicals in marijuana and have been widely tested and are actively used to treat patients with nausea while being treated with chemotherapy. The pill form is slowly making its way to the public market in areas in which marijuana is already legal. This method is being refined by doctors to treat specific problems such as reducing nausea, increasing appetite, relieving anxiety or relieving pain. It all comes down to research. I feel that the more research we are allowed to do, the more wonders we will unlock.

“The secret of getting ahead is getting started.”

- Mark Twain

As you can see, there are two very different aspects to the argument for the cannabis plant. One being hemp, the wonder-planet that can produce a large number of frequently used products more efficiently. The other, marijuana, a drug that has many uses of its own (both medicinal and recreational). The facts surrounding hemp production are hard to argue. Even those adamantly against marijuana (or any) drug use should be able to review the facts and agree that hemp needs a second chance. It is however not as easy to convince the opposition about the benefits of marijuana.

The most obvious use of marijuana is for recreational purposes. When words like marijuana or weed come up people immediately think about people smoking the drug to

get high and have fun, and this is a fair thought. Not just because the media has been pushing the 'stoner' image for years, but because it is true. People use marijuana to get high. It is without a doubt a function of the plant, and those that want it legalized likely want to be able to use the drug recreationally without fear of legal repercussions. The fact is, marijuana is a much safer drug than many others out there (legal or otherwise). Marijuana becomes even more safe when you begin to examine the various ways that people are not able to use the drug. Keep in mind we are still speaking strictly recreation use at this point. There are a large number of medicinal uses as well, but for now I will continue to focus on the largest factor of stigma.

Recreational drug use is something that occurs throughout the world. Certain places view certain drugs in entirely different lights. As I stated earlier, there are so many other drugs in the United States that the general population does not necessarily frown upon. Many people will not think twice about going out with their friend, coworkers, or significant others and sharing a few drinks. There is nothing wrong with this as long as the drug in question is not being abused. It is unfortunate that other drugs that are as ingrained in our history as alcohol is suffer the fate of stigma.

It is no hard task to prove that inhaling any sort of smoke is not good for you. It is true that marijuana smoke is an unfathomable amount less harmful than cigarette smoke, but it doesn't make it 'good for you' or 'healthy'. However, other ways to ingest the drugs are available and are consistently improving. These new methods were only made possible by getting started with research. Without the drastic changes to marijuana laws across the United States we would not be nearly as far ahead in marijuana research. Who knows where we could be today if the drug was not kept out of professional laboratories for so long?

One of the most common 'safer' alternatives for consuming THC is through a device called a vaporizer. Vaporizers heat the plant matter until they give off the active ingredient in marijuana, THC. In turn, they do not actually combust the plant and give off smoke. In 2007 a study was published in the *Journal of the American Academy of Neurology* that the effectiveness of a vaporizer for using marijuana. They discovered that heating the cannabis to a temperature between 180°C (356°F) and 200°C (392°F) yielded the following results: "Using CO as an indicator, there was virtually no exposure

to harmful combustion products using the vaporizing device. Since it replicates smoking's efficiency at producing the desired THC effect using smaller amounts of the active ingredient as opposed to pill forms, this device has great potential for improving the therapeutic utility of THC.” (11) This test eliminated one of the greater risks of associated with smoking, that is the potential for throat and lung damage. Vaporizers have swept the nation as the primary method to use THC.

Most users prefer to use the vaporizer for a variety of reasons. The first and already stated, because it no doubt decreases the already very few risks associated with using the drug. The second being the increase in efficiency. Users can vaporize less plant matter for a stronger and cleaner high (thus saving them money). The third is the ability to be discrete. When you use a vaporizer it does not actually produce smoke or even the smell that one may associate with marijuana. The smell from a vaporizer is still fairly distinct, but it is not overpowering or lasting like the smell actual smoke filling the air. Furthermore, people no longer have to vaporize the plant itself. Users can also vaporize oils that have been extracted from the plant. These oils are often cheaper and more efficient at getting the user the desired effect, while at the same time lessening the harmful effects even further and leaving less byproduct behind. The more research that is done on this topic, the more efficient it becomes.

The next very popular method for consuming THC is through food and drink. This method has been well known long before vaporization, but the process to make these products has been greatly refined. The method of making the butter for THC-based foods is not so different from vaporizing. The plant matter is often mixed with butter heated to a temperature that allows the active ingredients to release. The end product is a butter-substitute that can be used in the user's baking recipe of choice. One can also make a form of flour out of the product if they wish to not use butter or oils. As the processes improve, more alternatives becomes available. Dispensaries in legal-states are making wide varieties of food from the typical brownies and cookies, to hard and soft candies, to waffles and pancakes, to juices and milks, to pretty much anything else you can think of. The world of THC-food, or 'edibles' as they are often called, is vast and is a direct counter to the primary negative effects of marijuana consumption.

The next method, which is being constantly refined for medicinal purposes, is ingesting THC in pill form. There are a large variety of marijuana-based pills in both the recreational and medicinal world. The pills sold in dispensaries are no doubt different than the pills administered for cancer patients. As discussed previously, the pills for cancer patients are being constantly refined for specific uses. Scientists are working with these substances to produce pills that have specific functions (such as increasing appetite, aiding sleep, or relieving pain). The pills sold in dispensaries will often be pure THC pills. This is yet another method to directly ingest the drug while avoiding the most harmful effect of it.

As you can see, there are many methods of consuming marijuana recreationally that do not involve inhaling smoke. Anyone will agree that smoke is bad for you. It can and will cause issues with one's throat and lungs that would otherwise not occur. The more we allow the best minds to work with these nearly-harmless drugs, the better processes will become and the more safe it will be for everyone. The benefits of the cannabis plant are so extremely vast and it is a shame that it has been held back for so long. I can only hope that we unlock the true potential of hemp and marijuana in my lifetime. With the way things have been going over the past several years, I'd say it is a pretty safe bet.

Marijuana is one of the overall less harmful drugs that people use and abuse, but it does have its fair share of risks. As I have discussed before, a big factor in the health risks lies within the inhalation of smoke. There is an ever-increasing market for smokeless marijuana products and these all greatly reduce the risks that the drug presents. There are, however, other effects on the mind and body that are not related specifically to the smoke itself.

Heavy marijuana use is often associated with laziness and forgetfulness. Many studies have been done on the drug throughout history that do indeed prove that there are two distinct areas of the brain affected by marijuana: motor control and memory. Cannabinoids directly affect the neural signals that pass through the parts of the brain that control these functions. Experiments have shown that marijuana use can directly impede short-term memory formation. This is caused by the release of neurotransmitters in the hippocampus being hindered. "Neurotransmitters such as

acetylcholine, norepinephrine, and glutamate, resulting in a major decrease in neuronal activity in that region.” **(13)** Younger people that use the drug are more susceptible to the memory effects of the drug.

The effects on the memory all appear to be temporary. There are still studies that need to be done to obtain better results in regards to the lasting effects. Many marijuana users will use the drug consistently (without taking occasional breaks). This makes the short-term memory formation problem persistent. Studies were done at Harvard University on the neuropsychological performance in long-term cannabis users and showed that the effects would subside after approximately one month of not using the drug. **(14)** Some test subjects showed little signs of memory impairment after just seven days of not using the drug. Any sort of permanent brain damage caused by marijuana has not been proven over many years of studies. “An analysis of research studies with long-term, recreational users of marijuana has failed to reveal a substantial, systematic effect on the neurocognitive functioning of users. According to researchers at the University of California, San Diego (UCSD) School of Medicine, the only deleterious side effect found was a minimal malfunction in the domains of learning and forgetting.” **(15)**

There have been more conclusive studies when we begin to examine mental health. Marijuana use has been linked to depression, anxiety, schizophrenia and psychosis. These studies have only proven themselves through correlation and still have work to be done. One of the studies directly compared the mental health of those that told their general practitioner they use marijuana versus those that do not. This is only so reliable as many people many not tell their doctor this information.

The chemical that has been most related to schizophrenia from marijuana use is Cannabidiol (CBD). As discussed elsewhere in my paper, CBD is the secondary chemical in marijuana. CBD is a direct counter to THC (hemp products have a large amount of CBD, this is the chemical that will directly impair the ability to grow marijuana near a hemp field). This research has greatly piqued my interest because I was not aware of the real psychological effects that marijuana can have. Fortunately, these effects appear to mainly stem from the consumption of CBD, which is being rapidly phased out with marijuana-alternatives.

Those that run legal operations are vastly improving the way users consume marijuana. CBD content is being reduced with the ever-improving methods of making edibles and pills. Even improvements in the growing process are taking CBD content out of your standard marijuana plant. With the reduction of CBD we will see the reduction of potential permanent psychological effects of marijuana use. CBD isn't entirely bad. Some strains of marijuana are being tested with extremely high CBD content. The higher CBD content makes the drug better suited for cancer research. "In vitro CBD down-regulates, or "turns off", the activity of ID1, the gene responsible for tumor metastasis in breast and other types of cancers, including the particularly aggressive triple negative breast cancer." **(13)**

There are an array of other issues that can be caused by heavy marijuana use. One of the effects is on the cardiovascular system. Unlike the effects on memory, the cardiovascular effects are more prevalent in older people. Marijuana use, much like the use of many other drugs, can cause fluctuations in heart rate and blood pressure. This is a big reason why it affects older users more. These fluctuations do not greatly affect those with a more healthy cardiovascular system. However much like the issues with smoke (effects on lungs and throat), the cardiovascular issues mostly stem from the inhalation of smoke.

The effects on the neural pathways, while very real, are not entirely negative. There have been tests showing that very large doses of THC, doses that are not obtainable by normal means, can slow down the symptoms of Alzheimer's disease. "The active component of marijuana, $\Delta 9$ -tetrahydrocannabinol (THC), competitively inhibits the enzyme acetylcholinesterase (AChE) as well as prevents AChE-induced amyloid β -peptide ($A\beta$) aggregation, the key pathological marker of Alzheimer's disease." **(12)**

I believe that this boils down to the absolute need for thorough and uninhibited research of the drug. There are so many factors that come into play when deciding if the drug is "harmful", "helpful"... both or neither. The two active chemicals, THC and CBD, have been proven to have direct effects both positive and negative. The more research and tests that go into these drugs, the better we can understand how to make them work for us.

The most widely accepted use of medicinal marijuana at this time is to treat nausea especially in chemotherapy patients. Studies have been performed by the National Cancer Institute (NCI) and these studies have led to two cannabinoid drugs being approved by the Federal Drug Administration (FDA). The drugs 'dronabinol' and 'nabilone' have been thoroughly tested and have proven to reduce nausea caused by chemotherapy "as well as or better than" (1) other drugs that were previously approved by the FDA for this same purpose.

"Medicine is not only a science; it is also an art. It does not consist of compounding pills and plasters; it deals with the very processes of life, which must be understood before they may be guided."

— Paracelsus

If you agree that there is a problem with the overprescription and overuse of legal drugs in this country, then you must agree that an alternative is needed. Also if you agree that there is a problem with the social acceptance of the excessive drinking of alcohol, then you must agree that a drug proven less harmful should be reevaluated by our society. The stigma associated with marijuana use is slowly lessening as it becomes a large topic of debate. The country is slowly but surely coming around to the facts of research. A drug that has been proven next to harmless when administered and used properly needs to replace prescription drugs that are mentally and physically addictive and have proven to be extremely harmful to the body.

There is no telling how much more this plant can do for us. We, as a species, know so little about the capabilities of the world we live in. Every day there are vast improvements to what we know about our world, but it is true that only a very very small fraction of the possibilities have been truly revealed. With further research in to drugs such as marijuana, we can make an ever safer and more beneficial product for society. With further research in to resources such as hemp, we can improve the environment and efficiency in which we create necessary goods. The negative connotations created by businessmen and politicians with profits in mind should not hinder our understanding

of the world we live in and the resources that have great potential to improve society as a whole.

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