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# Abuse of Spice, Bath Salts, and Steroids

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ABUSE OF SPICE, BATH SALTS, AND STEROIDS  
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BY  
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CHEMISTRY

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**Abstract:** The abuse of three different drugs and whether or not they should continue to be banned in the United States is looked at. These three drugs are spice, bath salts, and steroids. In conclusion, spice and bath salts should continue to be banned in the United States due to the little knowledge known on the drugs and how they affect the body. Steroids on the other hand should only be banned in the use of sports, due to the unfair advantage that it gives users. For individuals not in sports, steroids should be legal since it is their choice to harm their body, but there should be lots of education offered to the community, so one knows what one is doing to their body.

### **Introduction:**

In Maryland, deputy Marty Brown stated, “a 23-year-old Frederick County resident ended up in a coma as a result of using Spice.” It was also later reported that the individual has permanent brain damage from spice use (McCarthy, 2012). ABC News stated that “in April 2011, investigators determine that Army Sgt. David Stewart was under the influence of bath salts when he killed himself, his wife Kristy and their 5-year-old son in Spanaway, Wash” (Dolak, 2012). On February 14, 2013, Oscar Pistorius shot and killed his girlfriend, Reeva Steenkamp. It was stated in the TIME magazine that, “Olympian’s lawyers may be considering a “roid rage” defense, arguing that Pistorius was under the influence of steroids, which can cause paranoia, jealousy, aggression and irritability, when he shot Steenkamp” (Stifferlin, 2013). In the media, these drugs are illustrated as dangerous causes of violent trends.

In this paper the abuse of three main substances are analyzed through scholarly literature review through the exploration of the uses, effects, and restrictions on each drug: spice, bath

salts, and steroids. In this paper it was also analyzed whether or not these drugs should continue to be banned in the United States. The drugs spice and bath salt should continue to be banned in the United States as well as steroids in sports use. However, steroids should not be banned outside of sports.

## **Literature Review:**

### **Spice**

Spice is a designer drug also known as K2 (Vashi and Chang, 2012). Spice is derived from natural herbs that are sprayed with synthetic chemicals and is primarily smoked by users. Spice is labeled as herbal incense for marketing purposes. Spice does not show up in regular drug tests, which is one of the reasons it has become so popular so fast. The misuse of spice was first discovered in the military, mainly due to the fact it is undetected in military drug tests. It has now been detected in certain urine tests that are able to identify spice metabolites in the urine (Loeffler et al., 2012).

Through multiple clinical trials, it has been found that spice has a much greater risk for acute psychosis compared to cannabis. This can be due to multiple factors. One of these factors is that the concentration of the spice varies greatly from dose to dose. The concentration depends on the amount of synthetic cannabinoid receptor agonist sprayed onto the plant material during production. Another factor could be the absence of cannabidiol in spice. Cannabidiol is commonly found in cannabis and is a natural compound with antipsychotic properties. Lastly, the synthetic compounds are full agonists in spice with greater potency compared to those found in THC (Loeffler et al., 2012).

Some of the chemical components in spice consist of a group of four different chemical structures for synthetic cannabinoid receptor agonists. These consist of: JWH, CP, HU, and benzoylindoles. All four of these bind to the same CB1 and CB2 cannabinoid receptors as the common drug, THC. CB1 receptor is expressed in the central nervous system and the CB2 receptor is expressed in the brain primarily on microglia. JWH is the largest structural group named after John W. Huffman, who synthesized many of these compounds. JWH-018 is one of the most common compounds detected in spice. Compared to THC, it has four times the affinity for the CB1 receptor as well as ten times the affinity for the CB2 receptor. JWH-018 is a full agonist, but there have been few animal studies and no human studies done to test the safety and toxicity of it.

The second group of synthetic cannabinoid receptor agonists is the CP compounds. CP-47,497 is a common compound found in spice which was originally developed by Pfizer. It has a high affinity for the CB1 receptor and is around 28 times more intoxicating than THC. The third group is the HU compounds which are structurally similar to THC, unlike JWH and CP. HU-210 was synthesized at Hebrew University. It binds to both receptors and is 100 to 800 times more potent than THC. Through studies in rats, it has been found to cause problems in learning and memory. The fourth group consists of benzoylindoles, which not much is known about. There are two chemicals in this group that are commonly found in spice, AM-694 and RCS-4, and it is known that these two substances bind strongly to both receptors (Loeffler et al., 2012).

The effects of this drug mimic that of cannabis, like tetrahydrocannabinol (THC). The main effect of spice is psychotic breaks, which can become extremely dangerous, especially with users that have history of such disorders already (Cannabis, 2011). Gunderson and colleagues found that users of cannabis, one kind of cannabinoids, develop a cannabis use disorder and a

physical dependence to these drugs. It has been proven that these symptoms occur during withdrawal and abstinence. They believe that there is a growing public health concern with the increase of this new generation of synthetic cannabinoid agonist, such as JWH-018 and CP 47,497 commonly found in spice (Gunderson et al., 2012). Gunderson and colleagues believe that spice is a growing public health concern and is in agreement with Loeffler and colleagues regarding why spice was banned in both European Nations and the United States.

Spice has been found to be sold in multiple ways to avoid any Controlled Substance Acts. Some of these ways are coming up with different names, such as K-2, Arctic Spice, and Dream; as well as labeling the packages "not for human consumption," "herbal," "natural," or "incense". These labels lead users to believe that spice is safe. In 2008, the U.S. border control started noticing attempts to import spice into the United States. In this same year, European nations started to ban spice due to many health and safety concerns, which could have led to the epidemic of spice being introduced to the United States. In 2009, the United States Drug Enforcement Agency (DEA) reported that the number of spice related events was 15, but in 2010, it jumped to 2,977 spice related events including hospitalizations and death. By November 2011, 38 states had outlawed spice with legislation pending in 11 others. This occurred after the U.S. Attorney General temporarily classified five synthetic cannabinoid receptor agonists, which are Schedule I controlled substances (Loeffler et al., 2012).

In the military, many service members have to go through standard military urine drug screens, which could be the main cause for reported uses of spice in multiple military departments. Spice is not detectable in military urine test, is inexpensive, and readily available to buy or obtain. The U.S. military prohibited spice through a multitude of regulations. The Uniform Code of Military Justice prohibits the use, possession, manufacture, distribution,

import, export, or introduction into an “installation, vessel, vehicle, or aircraft used by or under the control of the armed forces” a list of substances including marijuana and “any compound or derivative of any such substance” (Loeffler et al., 1042, 2012). The list of substances was extended under a clause, which includes any substance covered under the Controlled Substances Act. Following these acts and clauses, each service therefore issued a spice specific ban: the Marine Corps and Navy in March 2010, the Air Force in June 2010, and the Army in February 2011.

Thirty Airmen at the Tinker Air Force Base in Oklahoma in June 2011 were discharged for spice use. In October of the same year, 64 sailors were arrested for spice use while aboard the carrier USS Carl Vinson. In November, 28 sailors were found to be using spice on the USS Ronald Reagan. A reported total of 30 other service members were expelled from the military: 16 midshipmen from the Naval Academy in 2011, then 14 Coast Guard Academy cadets in 2012 (Loeffler et al., 2012).

### **Bath Salts**

When one thinks of bath salts the first thought that comes to mind is of little crystals that you would add to a bath, but not all are what they are labeled. Bath salts is also the informal name for a designer drug that contains substituted cathinones and looks just like regular bath salts, but are chemically completely different. Baths salts are generally formulated from methylone, mephedrone, or methylenedioxypropylvalerone (MDPV). Users consume bath salts in many ways including; snorting, shooting, and mixing with food or drink (Bath, 2012). Bath salts also became popular because they are hard to detect through a typical urine analysis (Loeffler et

al., 2012). The use of gas chromatography-mass spectrometry (GC-MS) has been useful in the detection of bath salts, through hair analysis and urine analysis (Dickson et al., 2012).

Cathinones originated almost 120 years ago in Africa and Arabia from the khat plant. The khat plant was used because of its stimulated properties. Some of the cathinones found in bath salts include but are not limited to: 3-fluoromethcathinone (3-FMC), 4-fluoromethcathinone (4-FMC), -methylamino-butyrophenone (buphedrone), beta-keto-N-methyl-3,4-benzodioxolybutanamine (butylone), methylenedioxyphyrovalerone (MDPV), 4-methylmethcathinone (mephedrone), 4-methoxymethcathinone (methedrone), 3,4-methylenedioxymethcathinone (methylone), and naphthypyrovalerone (naphyrone) (Marusich et al., 2012). MDPV is the most common active ingredient found in bath salts in the United States. In the Soviet Union around the 1930s, methcathinone was used as antidepressant. After that methcathinone was determined a substance of abuse in the 1970s and was classified a DEA Schedule I controlled substance. It was stated by Mark Ryan the director of the Louisiana Poison Control, that “if you take the worst attributes of meth, coke, PCP, LSD, and ecstasy and put them together, that’s what we’re seeing,” (Loeffler et al., 2012.)

As previously mentioned, bath salt drugs are not the bath salts that one uses in the bath but rather a concoction of different drugs. Bath salts are a group of structurally similar synthetic designer drugs with sympathomimetic attributes, which are also known as cathinones or beta-keto phenethylamines (Marusich et al., 2012).

Cathinone is a compound that is structurally identical to amphetamine, minus a single carbonyl bond on the cathinone. This extra bond increases the polarity which in turn decreases the blood-brain barrier penetration. The first major component in most bath salts is 4-



methylmethcathinone (mephedrone). Mephedrone became popular in the club scene in Europe after 3, 4-methylenedioxy-N-methylamphetamine (MDMA) was detected in importation. In the United States mephedrone hasn't been predominantly found in the club scene but more in the area of abuse associated with cocaine and methamphetamine.

Compared to mephedrone, MDPV is much less ubiquitous in Europe but it has become rather popular in the United States. Since MDPV is relatively new, there have been no pharmacological studies; therefore much of the information concerning bath salts is based off of a similar cathinone that is structurally alike, pyrovalerone. Pyrovalerone inhibits the uptake of norepinephrine and dopamine, but does not affect serotonin levels. This is similar to the effects reported for MDPV, including sympathomimetic stimulation and euphoria, with slight entactogenic effect. Many cases of MDPV use have reported sympathomimetic toxidromes and paranoid psychosis tendencies. Some other effects of MDPV include increased aggression, hallucinations, and paranoia (Loeffler et al., 2012).

The effects of bath salts are similar to those of cocaine and amphetamine (Chemicals, 2011). Some of these effects include, but are not limited to, headache, nausea, heart palpitations, hallucinations, and paranoia (Loeffler et al., 2012). Hollander and colleagues did a study on mice to test the long term effects of mephedrone and methylone by the use of behavioral models of memory, anxiety, and depression. They found that mephedrone has the ability to produce a long term reduction in the working memory. It was also found that both mephedrone and methylone don't show an effect on anxiety or depression characteristics (Hollander et al., 2012).

After an increase in reports from the poison center in 2010, bath salts became a known problem in the United States (Loeffler et al., 2012). Bath salts started arising in reports of abuse

around 2009 in Europe and in 2012 in the United States. Bath salts quickly spread in the United States, going from three reported abuse cases in July 2010, to 182 cases in December 2010, then to 749 in June 2011. According to Marusich and et al, the number of calls to the poison control centers regarding bath salts increased from 303 in 2010 to 6,072 in 2011 (Marusich et al., 2012).

Bath salts are packaged and sold in a similar fashion to spice, with labels marked “not for human consumption,” “bath salts,” or “plant food”. Bath salts are relatively new to the United States. Therefore not many tests have been completed to study the effects of using bath salts and the pharmacology behind bath salts (Loeffier et al., 2012).

The main components of bath salt, or in some cases the structural class of the molecule, was outlawed in most European nations in 2010. After these bans in many European nations the main active ingredient was changed to naphyrone to avoid some of the new legislative laws. Just like with spice, the United States attorney general used his temporary scheduling authority to classify three synthetic cathinones as Schedule I controlled substances in October of 2011. These consist of mephedrone, methylenedioxypropylone, and methyldone. Thirty-one states banned bath salts and eleven other states have legislation pending to ban bath salts as of July 2011. The Uniform Code of Military Justice has no specific bans for bath salts, unlike spice. However, many service regulations encompass bath salts (Loeffier et al, 2012).

## **Steroids**

Performance enhancing drugs, otherwise known as steroids, became increasingly popular in athletes after the 1956 Olympics, when the Soviet athletes were able to perform at such high levels. There are multiple ways to use steroids. The main way is through injection directly to the

bloodstream, but is not limited to this form. Users can also take pills or use creams (Anabolic, 2005).

Anabolic androgenic steroids (AAS) have been knowingly used for performance enhancement since the 1950s (Hakansson et al., 2012). AAS is a family of hormones that includes the hormone testosterone and abundance of synthetic testosterone analogues (Kanayama et al., 2010). Androgen is a naturally occurring compound that stimulates the development and maintenance of male characteristics in vertebrates by binding to androgen receptors. Androgen is required for males from heterogametic sexual differentiation in utero to the secondary sexual development during puberty to the establishment and maintenance of adult sexual function and fertility. Along with these effects androgen affects many reproductive and non-reproductive target tissues. This list includes bone, adipose tissue, skeletal muscle, brain, prostate, liver, and kidneys. Androgens are facilitated by one molecular species of androgen receptor that has a singular mode of action through the transcriptional activation of androgen response elements that are found in different target genes. The effects of androgen specificity on the previously mentioned target tissues can be accounted for by the local conversion of testosterone to a more-active or specific metabolite. A more active or specific metabolite could include dihydrotestosterone (DHT) or estradiol (Wu, 1997).

Steroids affect the body in two ways, androgenic effects or anabolic effects. Some androgenic effects include an increase in facial hair, deepening of the voice, and an initial increase in male sex glands. Some of the anabolic effects of steroids include an increase in muscles and size of internal organs, as well as an increase in calcium in the bones (Anabolic, 2005).

AAS started to become popular in athletes, but not until the 1980s was it known that steroid use was to help males bulk up their muscles and improve their physical appearance. Some of the side effects of AAS include: cardiovascular problems, endocrine difficulties, depression, and violent behavior. Through data tests it is now known that besides improved physical appearance that occurs from AAS there is also an increased desire to improve the physical appearance and strengthen one's self esteem. Studies have found that there is an association between AAS use and other substance abuse, a lower level of education, and physical exercise. AAS use is more common among adolescents than any other age group (Hakansson et al., 2012).

Through the testing of clinical syndromes, it has been deduced that testosterone alone is sufficient for in utero masculinization of the internal genitalia and postnatal skeletal muscle development, and the activation of sexual behavior through adolescence and young adult life. Sexual differentiation of the brain, bone mass accretion, and fusion of the epiphyses at the end of puberty is completed through the aromatization of testosterone to estradiol. After multiple tests were performed, there is no doubt that supraphysiological doses of androgens have an anabolic effect on muscle mass and strength in healthily functioning gonads in men. These effects can be further amplified by physical training (Wu, 1997).

Kanayama and colleagues believe that there will be an increase in users seeking substance abuse treatment from AAS in the upcoming years. They believe this since AAS was not widespread until the 1980s and those users at the time were young adults, these users are now reaching the age of higher risk for cardiac and psychological neuroendocrine complications. Users of AAS perceive their lifestyle as healthy and athletic, but do not consider their use of AAS pathological.

Kanayama and colleagues believe that there are three main causes of dependence of AAS in users. The first of which includes individuals with body-image disorders. The anabolic effects of AAS could help these disorders and allow users to become dependent on it. Another way that an individual could overcome body-image disorders is through psychological therapy or pharmacologic treatments. The second cause of dependence on AAS is that during withdrawal of AAS hypogonadism may occur, resulting in prolonged depression, which drives an individual to begin using AAS again. This effect could be treated through anti-depressant treatments and in some cases treatment with human chorionic gonadotropin or clomiphene to reactivate the neuroendocrine function. The third cause of dependence on AAS is the evidence which indicates that it possesses a hedonic effect. Hedonic effects include the ability to return to a stable level of happiness even under major positives or negative events or life changes. The result of hedonic effects is believed to result in no permanent gain in happiness only a temporary happiness. The hedonic effects could be treated in users through pharmacological and psychosocial treatments for human opioid dependence. This could benefit AAS users because opioids have a similar effect of dependence via mechanism (Kanayama et al., 2010). Compared to Kanayama and colleagues, Martin and colleagues thought that some of the risk factors for anabolic steroid abuse in male bodybuilders included: body-image disturbances, history of childhood conduct disorder, and poor father-son relationships (Martin et al., 2008).

A rare outcome has been found to occur through long-term use of oral contraceptives and high-dose anabolic androgenic steroids. This rare outcome has been established to be a factor in hepatocellular carcinoma. Hepatocellular carcinoma is one of the most common malignant and widespread tumors in the western world (Hardt et al., 2012). Another rare outcome that has occurred in patients with anabolic steroid abuse is hepatic adenoma regrowth. Martin and

colleagues conducted a case report about a 27 year old man that had a five year history of anabolic steroid abuse, mainly androstenedione and nandrolone, who reported long-lasting pain and nausea in the emergency room. Through multiple examinations, which included both a computed tomography (CT) and a magnetic resonance image (MRI), it was determined that the patient had multiple hepatic masses with the possibility of intralesional hemorrhage. After the patient underwent a lateral hepatic segmentectomy with an open cholecystectomy, he was informed that he was not allowed anymore steroid use.

After he went through his checkups months later the patient resumed the use of oral androstenedione. Martin reported that around three and a half years later the patient returned to the ER with an onset of symptoms similar to his previous symptoms and reported that he had used injected nandrolone six weeks earlier. After the same laboratory tests were completed it was determined that the patient contained several lesions on the liver, as well as intralesional hemorrhage, sub capsular hematoma, and intraperitoneal hemorrhage, all of which lead to the patient becoming tachycardic. Due to the patient's steroid abuse, he was not able to receive a liver transplantation and therefore had to undergo an angiographic embolization of the right hepatic artery. From this case, Martin determined that there is a correlation between the androgen dose and the potency of the steroid taken. With this patient, it was determined that the nandrolone most likely caused the development of the hepatic adenomas. Martin came to this conclusion because the other steroid that that patient was taking, oral androstenedione, has a fairly weak androgenic potential, whereas nandrolone has a particularly potent androgenic potential. Besides these points, the patient also had recurring symptoms shortly after going back to nandrolone. Since this case both nandrolone and androstenedione have been classified as Schedule III controlled substances due to their abuse potential. Some other liver complications

that are possible with AAS abuse include: cholestasis, elevation of aminotransferases, jaundice, and rare cases of hepatocellular carcinoma as previously mentioned above (Martin et al., 2008).

The interest in steroids continued to increase even after the International Olympic Committee banned use of steroids in the Olympics. The United States started putting bans on the use of certain types of steroids in 1988 and many more acts in the years following (Anabolic, 2005). From the United States National Household Survey by the Substance Abuse and Mental Health Services Administration in 1994, it was found that almost a million Americans had used AAS by the year 1994. Then in 2009, an anonymous survey by the Monitoring the Future Study found that the number of AAS users was well above 2 million in the United States (Kanayama et al., 2010).

### **Findings/Conclusion:**

#### **Spice**

The most common compound in spice, JWH-018, has a much higher affinity for the CB1 receptor and the CB2 receptor than what has been found in THC. This means that JWH-018 affects both the brain and nervous system at a faster rate. Just like the JWH-018 compound, the HU-210 compound, also found in spice, binds to both receptors but with an even higher affinity than JWH-018. The HU compounds in spice have been linked to problems in learning and memory in rats (Loeffler et al., 2012). Loeffler and colleagues also found that spice has a higher risk for acute psychosis than marijuana, which is another drug that has been banned in the United States, but in the last year has become legal in certain states.

Spice was first banned in the United States due to an increase in spice related incidents reported by the DEA from 15 to almost 3,000 events in just one year. Spice was also banned in Europe due to concerns that it leads to health and safety problems.

In 2012, an Atlanta student stated, "I honestly think I'm dying" after trying synthetic marijuana, also known as spice. After smoking the synthetic marijuana, it was stated in the Medical News that he collapsed to the ground, his heart rate sped up, and he felt intense panic and paranoia (Vashi and Chang, 2012). Vashi positions that even with states having banned five kinds of synthetic cannabinoids, manufacturers continue to modify the old compounds and create new compounds that avoid the law. Broider was quoted by Vashi saying that manufacturers will continue to create new compounds that avoid the law, so prohibition of these drugs will fail because there are loop holes in the legislation. In argument with Broider, Carreno of the DEA said that the new regulations were effective. In a crackdown in July, the DEA confiscated 5 million packets of finished designer drugs and enough materials to make at least 10 million more packets (Vashi and Chang, 2012).

The Hunterdon Drug Awareness Program in New Jersey stated that spice was not initially meant for human consumption. Spice had only been tested on animals and cell cultures, but had yet to reach the level to test in humans. From this information, spice is considered a dangerous drug, due to the fact that it hasn't been tested on humans. We do not know for certain how it affects all humans, along with the fact that it is not intended for human consumption. In their article on spice, the Hunterdon Program also stated from the National Institute on Drug Abuse (NIDA) that the drug found in spice, JWH-018, and its cousins have a chemical structure that is the same as some known cancer-causing agents (Hunterdon, 2012).



Spice is as dangerous to the user as it is to bystanders. The Hunterdon Program has linked synthetic cannabinoids with impaired driving incidents, aggression, mood swings, altered perception, and paranoia. All these symptoms have the ability to indirectly wound individuals that have chosen not to take the drug (Hunterdon, 2012).

In Michigan, citizens took it upon themselves and the community to stop the sale of spice after a string of high-profile crimes and tragedies involving spice. According to the Detroit Free Press, a teen allegedly beat his father to death and attacked his mother and a brother with a baseball bat. After the incident it was determined that he had bought spice and was believed to be under the influence at the time. It was also stated that the individual wanted to use the drug after the event to stop himself from having second thoughts about the attack. Then, in the Bloomfield Township, a teen was found dead on the beach after an overdose of K2. After these events and many more, the West Bloomfield community made the sale of synthetic marijuana and bath salts a misdemeanor, and in Oakland County, high ranking officers led an initiative to get businesses to voluntarily stop selling spice and K2. These communities decided to act quickly in banning these drugs due to the health, safety, and welfare of their young residents instead of waiting for the legislature to ban them (Abbey-Lambertz, 2012).

Spice should continue to be banned in the United States because it is a dangerous drug to have on the streets. This is due to the concentration of spice not being controlled. The concentration is unable to be controlled because it depends on the quantity of synthetic cannabinoid receptor agonist sprayed onto the plant during manufacturing (Loeffler et al., 2012). With a higher concentration of synthetic cannabinoid receptor agonist, the side effects could occur more frequently, and the effects from the drugs could be magnified. This could lead to an increase in severity of the psychosis and/or the deterioration of the mental state of a user.

## **Bath Salts**

The major group of compounds found in bath salts is cathinones. Cathinones have been shown to decrease the blood-brain barrier penetration. This in turn means that there is a decrease in oxygen flow through the brain and at high levels can cause severe brain damage or even brain death. Other symptoms arising from decreased blood flow to the brain include: delusions, extreme paranoia, hallucinations, or psychotic episodes (Loeffler et al., 2012).

Some of the main components determined to be in bath salts were banned in the United States in 2011, due to an increase in reported abuse from the DEA, similar to spice. In six months the number of bath salt incidents went from three to 182, and then six more months later 749 cases of abuse were reported (Loeffler et al., 2012). The poison control center also reported an increase in events including bath salts. They reported a jump from 303 events in 2010 to over 6,000 events in 2011 (Marusich et al., 2012).

In Rochester, NY 13WHAM News has determined that since the federal ban on synthetic drugs there has been a decrease in the numbers of related local calls to poison control, emergency room visits due to the use of bath salts. In March 2012 the number of incidents reported were 23, then in July 2012 104 incidents occurred, which dropped in August 2012 to 29 incidents, and finally in October 2012 only three incidents involving the use of bath salts were reported. From these results, it shows that the ban on synthetic drugs has proven to be effective in Rochester, NY (Dawson, 2013).

Bath salts should be banned in the United States at least until further testing can be conducted to determine the long term side effects of the drug on humans. It has been found that some components of bath salts produce a long term decline in the working memory in mice

(Hollander et al., 2012). If this test could be performed on humans, would scientists observe the same results? Further analysis of the drug could lead to modifications of legislation concerning bans, depending on the effects observed.

## **Steroids**

Steroids have been shown to have a positive short-term effect on people who consume them. Some of the positive effects of steroids include the increase in muscle mass and the ability to strengthen the functions of gonads in males (Wu, 1997). Yet, at the cost of the positive effects one also has the likelihood of some of negative long-term effects which include; cardiovascular problems, endocrine difficulties, depression, and violent behavior (Hakansson et al., 2012).

Steroids were banned in the United States in 1990 under Schedule III of the Controlled Substances Act in the Anabolic Steroid Control Act. At the time steroids were still under debated discussion. The DEA, FDA (Food and Drug Administration), AMA (American Medical Association), and NIDA (National Institute on Drug Abuse) all did not want steroids to be added to the controlled substances list, because at the time it was not believed that steroids caused any dependency issues that were required them to be placed on this list (H.R. 4658).

Steroids are also banned in all sports by the WADA (World Anti-Doping Agency) along with any precursors to hormones or related to hormone enhancers (WADA, 2004). They were found to be unfair in sports due to "the spirit of sport" as stated in the World Anti-Doping Code. In this code, it was stated that in sports, one is to follow the values of: fair play, honesty, respect for self and other participants, and respect for rules and laws. According to these values, using steroids conflicts with "the spirit of sport" (WADA, 2003). Steroids allow for an unfair

advantage by players who use them over players who do not. For example, in baseball, a user is able to hit the ball with a stronger force than a player that is not using steroids.

Steroids should continue to be banned in sports throughout the world however should not be banned in individuals who do not participate in sports. In sports steroids should be banned because of the unfair advantage that it allows users to have over non-users. Some individuals may not have the option to obtain steroids or may choose not to use steroids due to the long-term effects that have been observed. For individuals not in sports, it should not be banned because it is the individual's choice if they want to put their bodies through the positive and negative effects from steroids. Since these individuals are not competing against others and are just using steroids for their personal benefit, they should be allowed to use steroids at their discrepancy. These individuals should have their own judgment on using steroids because the long term effects have been experimentally tested and analyzed, and the effects only harm one's self, not others. Along with this it should be advertised that steroid use can cause long term effects, but it is up to the individual to use or not to use.

Overall, the drugs spice and bath salt should continue to be banned in the United States as well as steroids in sports use. Steroids however should not be banned outside of sports because the short and long term effects of steroids have been experimentally tested and steroids do not have the potential to harm bystanders other than the user, unlike bath salts and spice. The side effects of both spice and bath salts has been lead to psychosis, paranoia, aggression, mood swings, and impaired driving incidents, all which are harmful for innocent bystanders.

Some limitations in this study include the shortage of scholarly papers written on bath salts and spice as well as the lack of experimentation reported on the effects of both drugs. Both

spice and bath salts should be studied more and experimentally tested in the world of science, especially since there are so many forms of both available. In addition to this, many further scholarly articles are needed. In these additional scholarly articles, one can research the long term effects that spice and bath salts have on mice then research effects on the human body. One can also compare spice and bath salts and what would happen if an individual was to take the two drugs together.

This study is significant because in the past year, states have been debating making marijuana legal, even after it has been illegal and labeled as a drug since the mid 1930's under the Uniform State Narcotic Drug Act (Swain, 1937). Once marijuana became legal in my home state, Maryland, it became important to me to personally to decide if drugs similar to marijuana in context should also continue to be banned in the United States, or if there is a need to further study each drug with new information available and advances in science to determine if it should remain illegal or become legal again. This research can be used to help compare spice, bath salts, and steroids because there is no current research on all three of these drugs together. It can also be used to determine if current bans on such drugs are still necessary or if they should become legal in the United States.

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