The Relationship Between Cannabis and Violence: A Review

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This review critically examines the evidence dealing with the alleged relationship between cannabis and violence and considers some of the variables that enter into such an assessment. The consensus is that marijuana does not precipitate violence in the majority of those using it sporadically or chronically. However, there are certain individuals, such as those suffering from temporal lobe dysrhythmia, and certain situations of set and setting, in which marijuana may result in violence.

One of the most controversial issues in all of psychopharmacology is the nature of the relationship between the use of marijuana and violence. Concerning this perennial controversy, the President’s Commission on Law Enforcement (1967) observed that “here differences of opinion are absolute and the claims are beyond reconciliation” (p. 13).

During the course of the debate on this issue, four different kinds of relationships between marijuana and violence have been proposed. These are (a) that marijuana is a major cause of aggression as reflected in the number of crimes of violence associated with this drug, (b) that an underlying predisposition toward violence may be precipitated by the drug, (c) that some psycho- or sociopathic individuals are more likely to use various drugs, among them marijuana, but that there is no causal relationship between their behavior and their drug use, and (d) that marijuana does not incite violence, but rather acts to reduce the likelihood of such behavior occurring in individuals who are under the influence of this drug.

1 The terms marijuana, hashish, and cannabis will not be differentiated throughout this review. Both marijuana and hashish are crude preparations made from the plant *cannabis sativa L.* The principle active ingredient in cannabis is ∆⁹-tetrahydrocannabinol (∆⁹-THC), although the plant does contain other cannabinoids that may influence the actions of ∆⁹-THC. In general, hashish is considered to be more potent than marijuana, but because of variations in geographical areas and climatic conditions, marijuana from one particular area may be more potent than hashish derived from another location.

2 The terms violence and aggression will be used interchangeably and without distinction in reference to behavior that involves delivery of physical discomfort to another individual or group (cf. Buss, 1961). In many of the studies that will be discussed, reference is made to criminal activity, which may or may not include violence. Wherever possible, however, crimes of violence will be distinguished from other types of criminal activity. Since the sale, possession, and use of marijuana are themselves criminal activities, all persons convicted of such activities are ipso facto criminals. Individuals arrested or convicted for such criminal behavior will not be considered in this discussion except where such activity has also been associated in some manner with violence.

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This review will evaluate these various postulates and will examine which of these claims are plausible, which are probable, and the various factors that must be considered before formulating any tentative conclusions regarding the potential relationship between marijuana and violence.

Mythological and Etymological Evidence

One of the least scientific but yet most frequently called upon sources of evidence for the alleged connection between cannabis and violence is a centuries-old myth first recorded in the 13th century A.D. by the famous Italian explorer, Marco Polo. According to this account, an ancient sect called the assassins (ashishin) was led by a certain king known to the Crusaders of the 12th century as the "Old Man of the Mountain." This king was reputed to have built a magnificent garden in his mountain stronghold, which no one was allowed to enter without first ingesting a special potion. This potion caused the user to fall asleep, and when he awoke, he found himself in the garden surrounded by beautiful flowers and women. The legend quickly spread that this was the Paradise of which the prophet Mohammed had spoken, and the king shrewdly encouraged this belief to entice followers to his cause. To be allowed entry into the gardens, however, the king first demanded blind obedience. Very often, this meant the murder of his enemies, both secular and religious. Only after the assassination had occurred would the potion be administered, allowing the initiate to enter into "Paradise."

This story has served as the basis for the argument that cannabis is used by criminals to bolster their courage, on the grounds that the mysterious potion was hashish. Although Marco Polo himself never identified the drug, numerous writers have jumped to the conclusion that because the members of this sect were called ashishin the potion was hashish, the proof being the similarity between their name and that of the drug (e.g., Bloomquist, 1968; Fossier, 1931; Kingman, 1927; Louria, 1966; Schultes, 1969; Stanley, 1931). However, although there is a certain similarity between the two words, it is altogether uncertain whether assassin is derived from hashish or Hasan, the founder of the Islamic sect. Even if the etymological connection were true, there would still be no literary evidence that hashish induces uncontrollable violence, since according to the legend, the drug was taken after the crime had been committed, not before. Moreover, the accuracy of the story itself has been questioned, since it was told to Marco Polo by sources hostile to the Islamic sect. The story of the enchanted garden is, at any rate, not unique but is so common throughout the Near East that there is no way of knowing if it has any basis in actual fact (cf. Aldrich, 1970; Casto, 1970; Mandel, 1966).

Notwithstanding the uncertain etymological relationship between assassin and hashish, the superficial similarity is still cited as evidence of a relationship between cannabis and violence, even by those who are of the opinion that no such relationship exists. For example, although Maurer and Vogel (1962) state, "We do not know of any objective study showing a direct or causative relationship between marijuana and violent crime in a significant number of cases" (p. 328), they still offer the etymological argument in favor of such a relationship:

Any remarks concerning the relationship of marijuana to crime should be prefaced with the note that marijuana is a form of hashish, a most dangerous drug in its unadulterated form. We get the word assassin from the Italian assassina, which in turn is derived from the Arabic Hashshashin, meaning one who uses hashish; this etymology reflects rather accurately the cultural pedigree of the drug, which has been known for centuries to release impulses toward violence. (p. 327)

It was this etymological argument and legend of hashish-induced violence that H. J. Anslinger, Commissioner of the United States Federal Bureau of Narcotics, cited in 1937 as one of the main reasons that the use of cannabis should be outlawed.

Retrospective Case Studies

Superficially, there is a positive correlation between cannabis and violence. The use of marijuana is continually increasing, estimates
placing the number of users at around 20 million in the United States and at 200 million around the world (McGlithlin, 1972). At the same time there has been an ever increasing rise in crimes of violence. But as with all correlations, this association does not necessarily imply a cause-and-effect relationship. A correlation between cannabis use and violence could be interpreted to mean that marijuana does indeed lead to an increased probability of impulsive acts of violence. Alternatively, it might suggest that violent individuals eventually become marijuana users, in which case marijuana could not be the sole or primary factor in initiating them into a life of violence. Alternatively, the correlation might be interpreted as suggesting that the increase in use of marijuana, especially chronic use, and the occurrence of violence are simply factors in an overall deviant behavioral pattern. Mere citations of the instances in which marijuana has been associated in some way with instances of violence thus constitute no proof that marijuana itself is responsible for such behavior.

In this regard, one line of evidence that has been employed to support the position that marijuana incites violent behavior has been the compilation of lists of crimes supposedly committed by individuals who were in possession of marijuana or who were allegedly under the influence of marijuana at the time of their arrest (e.g., Anslinger, 1937; Bloomquist, 1968; Giordano, 1968; Harney & Cross, 1973; Merrill, 1938; Munch, 1966; Wolff, 1949).

Rarely is it the case, however, that an attempt is made to prove that marijuana itself was a precipitating factor in the commission of the crime since, unlike the case of alcohol, there are no easily implemented tests for chemical detection of marijuana in the blood or urine.

In most cases, the arresting officer relies on self-admission or presumption of use because of possession to associate marijuana in a particular case, but rarely is he in a position to know accurately what has transpired before a particular act. Consequently, he is not cognizant of all the relevant details that led up to the violent behavior. Indeed, law officers readily admit that there is often insufficient evidence to identify marijuana as a contributing factor in a crime. For example, in offering one such list of crimes as proof of the effects of marijuana on violence, Anslinger (1937) acknowledged that “the Bureau of Narcotics is not in possession of full details regarding some of the cases which were not reported in connection with seizures of the drug” (p. 65). This admission has also been reiterated by Harney and Cross (1973, p. 74), but these law enforcement officers add that though they may not have had the full information on a case, “nevertheless these [dubious case reports] can be cited as a caution to law enforcement people!” (cf. Asuni, 1964; Kolb, 1962).

The tendency to credit marijuana with aggression-inducing properties despite the lack of specific evidence to that effect is particularly evident in the examination of cases purported to corroborate such a relationship prepared by the Foreign Policy Association which were “culled at random from the files of the U.S. Bureau of Narcotics” (Merrill, 1938, p. 28). However, Bromberg (1939) reexamined these cases and raised a number of questions about their interpretation:

Among the 10 patients, the second, J. O., was described as having confessed how he murdered a friend and put his body in a trunk while under the influence of marihuana. J. O. was examined in this clinic; although he was a psychopathic liar and possibly homosexual, there was no indication in the examination of history of the use of any drug. The investigation by the probation department failed to indicate use of the drug marihuana. The deceased, however, was addicted to heroin. (p. 9)

The main conclusion possible from case-list data is that some marijuana users may commit crimes of violence. Such data, however, neither prove nor disprove that marijuana incites individuals to commit antisocial acts (cf. Kolb, 1962).

**Associational Studies**

Another method that has often been employed in assessing the relationship between marijuana use and violence has been to examine criminal records to determine the incidence of crimes committed by marijuana users, the idea being that if marijuana users
commit more crimes than nonusers, marijuana may be a predisposing factor in this increased criminality (cf. Goode, 1970). Such studies can be divided into two subcategories: (a) those in which the incidence of crimes are catalogued and (b) those in which they are not only catalogued but also compared with the incidence of crimes among various control groups, for example, criminals not using marijuana, criminals using other drugs, or the total prison population.

Although somewhat superior to the case study method, these associational studies entail many of the same problems inherent in the case study method: Although they may give some idea of the use of marijuana by those arrested or convicted of a criminal offense, there is no way of knowing whether the arrestee was under the influence of marijuana at the time he was apprehended; if the subject is a user of many drugs, there is no way of determining which drug, if any, is associated with his criminal behavior; finally, the evidence taken from criminal files is based on a biased sample. For instance, Grupp (1971) has shown that individuals with no prior criminal record are more likely to be acquitted or to have their cases dismissed for marijuana-related offenses than not. On the other hand, the chances of being committed to prison for marijuana-related offenses (or for any offenses in fact) are markedly increased if one has a prior criminal record (cf. Brotman & Suffet, 1973). This means that marijuana users with prior criminal records are likely to be overrepresented in any study of prison populations. These factors have rarely been addressed in studies of prisoner populations, and as such, all such investigations must be evaluated with a great deal of circumspection.

Crime Cataloguing

One of the first studies of the effects of cannabis on criminality to appear in the literature was that reported by Fossier (1931), who contended that “one out of every four persons arrested in this city (New Orleans) is addicted to marijuana [sic].” Fossier stated that out of 450 prisoners (he actually refers to 492), 125 were said to be confirmed marijuana addicts, 18 to 31 years of age. More than half of these 125, he stated, were white rather than black. Fossier then gave a breakdown of the nature of the crimes of these prisoners, indicating that 68 prisoners had been arrested for sale or possession of cannabis. Of the remaining users of cannabis, 17 out of 37 were charged with murder, 13 out of 145 were charged with forgery, 36 out of 195 were imprisoned for grand larceny, and 21 out of 115 were charged with assault and robbery. No mention was made as to how this sample was chosen or whether these subjects used other drugs.

In 1933, a brief study of the effects of cannabis on U.S. military personnel in Panama was reported by Colonel J. F. Siler, Chief Health Officer, and his co-workers (Siler, Sheep, Bates, Clark, Cook, & Smith, 1933). According to their findings, the proportion of delinquencies resulting in trial by military court, in which possession or use of marijuana was also one of the charges, was only 1.17%. Of these, only 4 cases (.09%) involved a charge of violence or insubordination, and only 1 of these cases involved actual violence (striking a military policeman).

In 1939, Bromberg reported the results of an analysis he conducted of the arrest records of criminals in the psychiatric clinic of the Court of General Sessions in New York County between the years 1932 and 1937. Out of a total of 16,854 prisoners, only 67 (.004%) were admitted cannabis users, and out of these 67, only 6 had been charged with crimes of violence. On the basis of these data, Bromberg concluded that use of marijuana did not necessarily lead to a criminal career.

In 1942, a study of the relationship between crime and cannabis use in India was reported by Chopra, Chopra, and Chopra (1942). The investigators noted that cannabis was generally used chronically by the poorer classes in India, and most of the criminals in that country belonged to the lower strata of society. As far as premeditated crime is concerned, their opinion was that “the results of continued and excessive use of these drugs in our experience is to
make the individual timid rather than to lead him to commit crimes of violent nature” (p. 168).

Under the direction of Schoenfeld, the Mayor’s Committee on Marihuana (1944) also probed the relationship between cannabis use and violent crime. Their methodology basically involved interviews with law enforcement officers. On the basis of these discussions, the Committee concluded that there was no proof that major crimes were associated with the use of marijuana. Although it was found that many marijuana smokers were guilty of petty crimes, the Committee noted that the users’ criminal careers had usually existed prior to the time the first marijuana cigarette had been smoked.

Freedman and Rockmore (1946) examined the war records of 310 soldiers who were referred (because of violation of military offenses) to the Army Medical Hygiene Unit, a clinic similar to a community psychiatric clinic. Of these 310, 271 were black and 39 were white. Nearly all (92.2%) of these soldiers admitted to frequent or occasional use of marijuana. Freedman and Rockmore found that most of the offenses (99.3%) that these soldiers had committed, however, were of a nature that would not be considered a felony in civilian life, for example, AWOL (cf. Tennant & Groesbeck, 1972). Moreover, in examining the civilian arrest records of these subjects, the investigators found that in most cases their antisocial behavior occurred prior to their use of marijuana. Freedman and Rockmore found that most of the offenses (99.3%) that these soldiers had committed, however, were of a nature that would not be considered a felony in civilian life, for example, AWOL (cf. Tennant & Groesbeck, 1972). Moreover, in examining the civilian arrest records of these subjects, the investigators found that in most cases their antisocial behavior occurred prior to their use of marijuana, indicating that the drug had had no initiating influence on their criminal activities.

In contrast to these findings, C. G. Gardikas (1950), head of the Greek Criminal Service in Athens, published an analysis of 379 cases of individuals who had been arrested for use of cannabis between 1919 and 1950. Of these, 117 were subsequently re-arrested for other criminal activities, the nature of which was not identified. The other 262 had either had criminal records prior to their arrest for usage (209) or else had not been arrested for any subsequent crimes except cannabis use or vagrancy. On the basis of these data, Gardikas concluded that use of cannabis leads to criminal activities. However, the selection procedure by which Gardikas selected these data was not indicated, so it is not known whether the 379 cases making up the sample were randomly obtained. Furthermore, although they had not been previously arrested, it is not known if these 117 individuals had not been previously engaged in criminal activities. Although these methodological criticisms have often been raised in connection with this study (e.g., Goode, 1970; Kaplan, 1970), they are just as pertinent to many of the other studies discussed in this section, in which no relationship between cannabis and criminal activity was discussed.

Andrade (1964) interviewed a large number of patients passing through an insane asylum in Brazil over a 10-year period, whose records indicated use of marijuana. Of the 120 cases examined, no indication of criminal behavior associated with cannabis was discernible. Since no description of how the relevant information was obtained or how it was analyzed was presented in Andrade’s report, it is difficult to evaluate its contents or the conclusion by the author that cannabis and crime are not directly related.

Lambo (1965) compiled a list of crimes from three West African countries over a 2-year period. Thirty-seven (50.6%) out of 73 arrests for murder, 82 (31.1%) out of 263 arrests for assault and battery, and 123 (26%) out of 472 arrests for sex offenses against women were attributed to users of cannabis. No details whatsoever were given as to how this connection with cannabis was arrived at, whether the subjects were poly-drug users, what their social background was, or whether they had psychiatric problems.

Cataloguing and Comparisons

In 1946, Bromberg and Rodgers reported the results of their analyses of Naval and Marine prisoners incarcerated at the U.S. Naval Prison in Portsmouth, New Hampshire. Out of a total number of 8,280 prisoners convicted between 1943 and 1945, only 40 (.0048%) were identified as marijuana users (31 were blacks, 8 were whites, and 1 was Mexican). Of these 40, only 3 were charged
with violent crimes (striking an officer or assault). The remaining 37 were charged with AWOL, theft, or possession of narcotics. To place these data in perspective, a random sample of 40 nonusers of marijuana was also analyzed. Of these, 2 were charged with crimes of violence. On the basis of these results, the investigators concluded that there was "no positive relationship between aggressive crime and marijuana usage in the Naval Service" (p. 826).

Souef (1971) compared the criminal records of 553 Egyptian convicts incarcerated for cannabis-related crimes with those of 458 control subjects from similar prisons who had been arrested on other charges. Significantly fewer of the cannabis users were found to have had criminal records prior to their arrest (5.7%), compared with control subjects (13.5%). Moreover, the control groups had committed a higher number of crimes per person (5.3%), compared with the cannabis users (4.5%). When interviewed, only 6% of a group of hashish users stated that in their opinion cannabis users tended to engage in criminal actions more than did nonusers. By comparison, 56% of a group of noncannabis-using convicts contended that cannabis users did engage in criminal acts more than nonusers. Apparently, many Egyptian convicts also believe cannabis use is related to criminal behavior, although they have not used cannabis themselves.

In a study of arrestees conducted by Eckerman, Bates, Rachel, and Poole (1971), 979 (51.8%) out of a total of 1,889 subjects from six major U.S. cities (Chicago, New Orleans, New York, Los Angeles, San Antonio, and St. Louis) admitted to either current or past use of cannabis at the time of their arrest. It should be noted, however, that no inquiry was made as to whether the subjects were under the influence of the drug at the time of arrest, and that these data were based on arrest charges and not convictions. Although users of marijuana were more frequently charged with robbery (18.7%, compared with 10.7% for users of other drugs and 11.7% for nondrug users), the incidence of assault or murder among marijuana users was only 12%, compared with 18.5% for other drug users and 26.2% for nonusers of drugs. The data with respect to hashish use were similar. The incidence of crimes of violence (assault and murder) among hashish users was 9.5%, compared with 15.2% for other drug users and 26.2% for nonusers of drugs.

Weitzner and his co-workers (Weitzner, Smith, Pollack, Gerver, & Figlio, 1973) examined the arrest records of individuals aged 16 to 21 years in five counties in New York State. Out of a total sample of 1,776, 78% of the first-time marijuana offenders had no previous criminal record. Only a small percentage (3.9%) of these first-time offenders were subsequently institutionalized, thus corroborating Grupp's (1971) data. Again, as noted by Grupp, the probability of being institutionalized for a marijuana-related offense was much greater if the individual had a prior arrest conviction. With respect to subsequent arrest records, Weitzner et al. found that among those individuals whose records they could locate (847), 10% were rearrested for criminal offenses involving bodily injury, theft, or property damage, whereas 36% had no subsequent arrest record. The remaining individuals were rearrested mainly for drug-related violations.

Although their study was based on a very small sample, Weitzner et al. also found that among those with no prior criminal records, first-time marijuana offenders who were imprisoned were more likely than those marijuana offenders who were not incarcerated to be recidivists, suggesting that the prison experience may have contributed to their subsequent antisocial activities.

Tinklenberg and Woodrow (1974) interviewed male adolescent offenders who had been incarcerated between 1971 and 1972 at the Karl Holton School, a moderate security institution in California. Fifty subjects charged with assaultive crimes and 80 subjects charged with nonassaultive crimes (e.g., narcotic violators, car theft) were examined. Of the subjects charged with assault, 90% admitted using marijuana. Likewise, 95% of the subjects charged with nonassaultive offenses also admitted trying marijuana at least once. With regard to hashish, 50% of the subjects charged with assault admitted
use, compared with 76% among the subjects charged with nonassaultive offenses. When multiple-drug users were asked which drugs they felt would be least likely to incite them to violence, most subjects chose marijuana and hashish.

Friedman and Friedman (1973) studied 498 lower-class adolescents, ages 15 to 18, from the inner city sections of Philadelphia, many of whom had criminal records. No significant relationship was discovered between official police records and use of drugs such as marijuana, heroin, and amphetamines. On the basis of self-report questionnaires administered to these subjects, however, drug users reported more total delinquent acts than did nonusers of drugs. Comparison of marijuana users with other drug users indicated that "marijuana users, in comparison to users of other kinds of drugs, reported the fewest number of antisocial, illegal, and violent activities in relation to either obtaining or using drugs" (p. 460). With respect to the question of causal relationships, the investigators found that first criminal offenses significantly preceded first drug offenses on record, suggesting that use of marijuana or other drugs does not precipitate antisocial behavior.

Jacoby and his co-workers (Jacoby, Weiner, Thornberry, & Wolfgang, 1973) also studied an adolescent population from the Philadelphia area. Examining the arrest records of individuals under and over age 18, marijuana users were found to have been arrested for more offenses, serious or otherwise, than nonusers of drugs. This relationship was weakened somewhat, however, when controlled for race and socioeconomic background. Although their data indicated a significant correlation between marijuana use and criminal activity, the investigators noted that their data had no bearing on the problem of whether drug use precedes the commission of nondrug offenses.

Robins (1973) investigated the arrest records of Vietnam war veterans. There were no differences between marijuana users and nonusers of drugs in the number of arrests for assault. There was also little difference between these two groups in the number of arrests for crimes of violence.

In contrast to the methodology of the previous studies, which examined marijuana usage in a subject pool consisting of individuals coming into contact with the police, a number of sociologists have studied marijuana users in the general population to determine whether they commit more crimes of violence than do nonusers.

One recent approach has been to question individuals who admit to using marijuana but who have not been apprehended for cannabis use by the police. The subject pool for one such study (Blum, 1969) were the students on five different campuses in California, and the nature of the data were the responses of these students to questionnaires and interviews. Of the total student population polled (about 1,300), 19% admitted to using marijuana. Of these, less than 1.0% stated that they engaged in fighting or criminal behavior while under the influence of the drug or as a result of immediate prior effects of the drug. As a comparison for these data, Blum asked the same questions concerning alcohol. Of the 94% who admitted use of alcohol, 8% stated that they got into fights and 5% admitted engaging in crimes while under the influence of alcohol.

Goode (1970) interviewed 204 marijuana users in the New York City metropolitan area and found that their arrest rates were not significantly different from those of the general population. However, the nature of the crimes in these two groups was markedly different. Whereas most arrests in the general population were for offenses involving drunkenness and disorderly conduct, users of marijuana were most frequently arrested in connection with participation in political demonstrations. (The actual charges were not stated.)

A similar study was sponsored by the National Commission on Marihuana and Drug Abuse and conducted by Goode (1972). Five hundred fifty-nine 15- to 34-year-old males in West Philadelphia were interviewed to determine differences in criminal behavior between users and nonusers of cannabis. Of the 559 subjects, 72% acknowledged usage of
marijuana; however, Goode found no differences between users and nonusers of marijuana in the number or kinds of aggressive or violent crimes admitted to by those interviewed.

Tart (1970) administered a lengthy questionnaire to experienced marijuana users in which he asked them to rate how they felt and behaved when intoxicated with marijuana. Of the respondents, 77% stated that they never engaged in antisocial acts uncommon to their usual behavior, 22% indicated that they rarely did so, and only 1% stated that they sometimes did so.

Similar findings were reported by Halikas, Goodwin, and Guze (1971). In their study, only 4% of the respondents stated that they experienced an increase in feelings of aggression under the influence of marijuana, compared with 43% who answered that they occasionally did so and 53% who answered that only once or never did they experience any increase in hostility.

Hochman and Brill (1973) mailed questionnaires to 10% of the UCLA undergraduate student body selected at random. Out of 1,400 questionnaires returned, 480 students identified themselves as marijuana users. Every fourth student who used marijuana was then selected for further study and was compared with a group of nonusers. No differences were found between users and nonusers in the number of arrests or convictions for misdemeanors or felonies. Other than arrests for use of marijuana, there were no significant differences in the legal histories of these two groups. It should be noted, however, that the respondents in this study were all volunteers and that nonvolunteering users of marijuana might have had different arrest records than those who did participate. On the other hand, the same might be said of the nonvolunteers among the nonusers.

Fisher and Steckler (1974) surveyed 530 marijuana users as to their experiences with marijuana. Only 22 reported feeling more anger under the influence of marijuana.

**Experimental Studies**

Another approach that has sometimes been taken is to ask subjects to state how they feel while actually under the influence of marijuana. Hollister, Richards, and Gillespie (1968) reported that after receiving Δ⁹-THC, subjects stated that they felt less aggressive than before. However, this decrease did not occur until five hours after drug administration.

Abel (1972) administered the A and B scales of the Jackson Personality Profile to subjects before and after they smoked marijuana. A control group was undisturbed throughout the test–retest session. Analysis of the responses to the questions involving feelings of aggression revealed no change in the status of the marijuana group. Control subjects, however, experienced a significant increase in their test–retest aggression scores. The explanation for this latter increase probably lies in the fact that the test–retest session was lengthy (over three hours) and subjects had previously been told that the testing conditions would not take long. The increase in subjective feelings of aggression was thus probably a response to being asked to participate in the tedious test for a longer time than had been anticipated. Although the marijuana subjects were kept for a similar length of time, the absence of any increase in their subjective feeling of aggression could possibly have been due to the effect of the marijuana. However, the absence of a placebo control renders the findings of this study equivocal.

Klapper, McColloch, and Sidell (1972) administered different doses of isomers of Δ⁹-THC either orally, intramuscularly, or intravenously to a group of male Army volunteers and compared their responses to the Minnesota Multiphasic Personality Inventory (MMPI) under the drug with their predrug responses, taken long before the experiment. No placebo injections were given to any of the subjects. The investigators divided their subjects into those showing impairment on a number facility test and those not exhibiting any impairment, and labeled the former marijuana sensitive and the latter marijuana resistant. This resulted in some groups having an N of 3. Nevertheless, significant correlations were obtained for higher hostility and aggression scores for subjects identified as
marijuana resistant and for lower hostility and aggression scores for subjects exhibiting marijuana sensitivity. Although interesting in its findings, this study suffers from numerous methodological problems, which preclude too much weight being attached to these observations without additional attempts at replication.

Domino, Rennick, and Pearl (1974) permitted subjects to smoke as much marijuana as they desired. When asked to rate how “high” they felt, subjects stated that they felt as “high” or “higher” than they had ever been before. Under these conditions they were asked to rate how aggressive they felt, and these responses were compared to their pre-drug responses. Subjects given marijuana or cigarettes containing placebo did not differ significantly in their pre- and postdrug test scores.

Studies in which subjects are asked to rate their feelings while under the influence of marijuana are also subject to the accusation that they do not reflect the responsiveness of the subject under “natural” conditions. In the laboratory, the drug is administered to the subject under conditions in which there is typically a minimum of conversation between experimenter and subject. Under such conditions, the marijuana user may become bored and sleepy. Under natural conditions, smoking of marijuana is typically a social activity in which individuals pass the cigarette from one to another. There are no restrictions on communication and the group can thus modify the behavior of the individual. This modification can take the form of reassurance in the case of a panic reaction or hostility in the case of individuals who say or do things that are not appreciated. Regardless of the nature of the effect, a study conducted under “natural” conditions is likely to yield results different from those obtained in sterile laboratory settings.

Such “natural” studies have been conducted using alcohol (e.g., Boyatzis, 1974; Hartocollis, 1962; Tamerin & Mendelson, 1969) and could be modified for studies involving marijuana. Group studies, in fact, would appear to be essential if there is ever to be any resolution of this issue, since aggression requires the interaction between two or more individuals. Testing subjects in isolation is thus not likely to reveal how the drug affects antisocial behavior. Preliminary studies of this nature have, in fact, been reported (Salzman, Kochansky, & Porreno, 1973). Although the methodology and data were only presented in summarized form, Salzman and his co-workers state that under the influence of marijuana, subjects exhibited less verbal hostility in a group setting than under non-drug conditions.

**General Considerations**

Since violence does not occur in conjunction with marijuana with such reliability that a researcher can plan controlled studies of such behavior, he must rely on self-admission, hearsay reports of witnesses, or presumption of marijuana use by an individual as a consequence of possession by that individual in inferring that marijuana may have precipitated that behavior. The problems inherent in such an approach are obvious: Possession may not mean usage; so-called witnesses are not always reliable observers; and although marijuana users tend to be open about their drug use, admission of marijuana use, especially by an individual under arrest or in prison, must be treated with caution. The main important consideration, however, is not whether an individual is a user of marijuana but whether he was under the influence of the drug at the time he engaged in a particular act. Since there are no routine chemical tests currently available that detect the presence of marijuana in the blood or urine, there is no practical way of actually determining whether or not an individual was, in fact, under the influence of the drug at the time some behavior occurred. This, in turn, raises a number of other considerations, which Tinklenberg (1973) has enumerated and which will now be considered.

**Pharmacological**

Among those pharmacological factors that are basic to the issue of cannabis’ effects on aggression are drug dosage, immediate and
delayed effects, duration of use, polydrug use, and drug adulteration.

The cannabis literature dealing with animals suggests that low doses of marijuana increase excitatory behavior, whereas high doses produce depression (Abel, 1970; Davis, Moreton, King, & Pace, 1972). This indicates that the relationship between drug concentration in the body and certain kinds of behavior involving motor activity is not linear. If we assume that aggression is more likely to occur under conditions of increased motor activity than under conditions of sedation, then it is essential that dose–response data be available if any unambiguous relationship between marijuana and behavior such as aggression be delineated. In the case of alcohol, the relationship between aggression and violence is also somewhat moot, but the problems have become less operationally formidable than with marijuana. For instance, intoxication is generally defined in terms of a blood alcohol level of .1% or above. Using this criterion, Shupe (1954) found that violence is more likely to occur at blood levels indicative of intoxication than at lower levels. At very high blood alcohol levels, however, individuals become stuporous and incapacitated, and the probability of violence occurring in this condition is greatly reduced. Without comparable information and criteria concerning marijuana, it may be difficult to discuss unequivocally the behavioral effects of this drug.

Since the concentration of the principal active ingredient in cannabis, Δ⁹-THC, varies considerably according to the geographical area in which the plant is grown and the way in which it is cultivated, harvested, and cured, it is not possible to compare unambiguously experiments or reports concerning the relationship between cannabis use and violence from different countries if the concentrations of the various constituents in the marijuana in question are not specified.

Another important aspect of the dosage problem that warrants further comment is that pharmacological effects become increasingly dominant as dosage is increased. With low dosages, environmental variables determine to a certain extent the reaction to the subjective effects of being in the drug state. At higher doses, environmental factors assume less importance (cf. Jones, 1971; see also below).

The time course of drug action is another consideration. For one thing, it is necessary to determine whether the individual was actually under the influence of the drug at the time of some particular event. Another consideration is that the effects of marijuana tend to vary quantitatively, and sometimes qualitatively, as a function of time after drug administration. For example, in animals, a given dose of marijuana tends to produce an initial period of motor excitation followed by a period of depression (Garriott, King, Forney, & Hughes, 1967), a phenomenon also seen in human experimentation (cf. Allentuck & Bowman, 1942). In humans, the onset of drug effect occurs within 5 to 10 minutes and the peak effect occurs at around 1 hour, if the drug is smoked. If ingested orally, onset occurs around 30 to 60 minutes, and peak effect occurs at around 3 hours (Lemberger, Weiss, Watanabe, Galonter, Wyatt, & Cardon, 1972). In this regard, Chopra, Chopra, and Chopra (1942) note that in India the number of crimes associated with cannabis tends to be greater in the case of individuals who smoke the drug than is the case for individuals who consume it orally. They attribute this difference to the fact that the effects produced by smoking are more rapid and more intense.

With respect to frequency of use, it is not possible to offer any definitive statement, since few studies of the effects of chronic use of marijuana have been carried out under controlled conditions. Nor can we appeal in this regard to non-Western societies and underdeveloped countries for such information, as has been suggested (e.g., Miller, 1967), since controlled studies of the cannabis–violence relationship have not been conducted abroad. Although we do have opinions from abroad, these tend to be contradictory. For example, there are claims coming from countries such as Brazil (Cordeiro de Farias, 1955; Wolff, 1949), Greece (Gardikas, 1950), India (Dhunjibhoy & Bomb, 1930), Morocco (Benabud, 1957), North Africa (Bouquet, 1951), and West Africa (Lambo, 1965) that cannabis induces aggression. However, we also have testimonies from these areas that no such general relationships exist in these areas,
such as Brazil (Andrade, 1964), Egypt (Abdel-Nabi & El-Nagdi, 1960; Soueif, 1971), India (Carstairs, 1954; Chopra, Chopra, & Chopra, 1942; Indian Hemp Drugs Commission, 1893–1894), and Nigeria (Asuni, 1964).

In considering chronic marijuana usage, the problem of possible cumulative effects must be seriously considered. The rate of elimination from the body of Δ⁹-THC and its metabolites is extremely slow. Only 50% of the drug is eliminated from the body during the first 24 hours after drug administration, and traces of these substances have been detected in the body as long as eight days after a single drug administration (Lemberger, Silberstein, Axelrod, & Kopin, 1970; Lemberger, Tamarkin, Axelrod, & Kopin, 1971). There is the possibility that with chronic use of cannabis, cumulative effects might have important consequences for subsequent behavior. There is, however, a certain amount of evidence that chronic users of marijuana may respond physiologically and behaviorally to a given amount of this drug differently than do casual users. There is also evidence that chronic users of marijuana tend to be more hostile and rebellious in their attitudes than do light or nonusers (Brill, Crumpton, & Grayson, 1971). It is also important to note, however, that chronic users of drugs are likely to be more visible and better known to police than are casual users, and hence their activities may come under closer scrutiny in general. If these individuals engage in antisocial behavior, they are thus more likely to be apprehended, and their behavior is more likely to be discussed in the context of their drug-using behavior than is the case for the casual drug user, whether or not there is any connection between the two kinds of behavior. A study reported by Mirin, Shapiro, Meyer, Pillard, and Fisher (1971) also suggests that chronic users of marijuana may react differently to certain situations than would light or nonusers. These investigators administered a battery of tests to two groups of subjects who had previously been selected on the basis of their admitted use of marijuana. One of these groups was classified as heavy users (smoked marijuana every day), whereas the other group was classified as casual users (once a week or less). Among the tests given to the subject, in addition to psychiatric interviews, were the Buss-Durkee Scale, which is a self-report test of the frequency of engaging in aggressive behavior, and the Psychiatric Outpatient Mood Scale (POMS), which indicates current feelings. No differences between subjects were found on the Buss-Durkee Scale, but heavy users scored significantly higher than casual users on the POMS. However, when the POMS was readministered to these subjects at a later time in a noninterview situation, the differences between the two groups were no longer present. Mirin suggests that the reason for the findings in the first test was that the heavy users may have been reacting differently to some aspect of the psychiatric interview.

It should be noted, however, that in addition to being heavy users of marijuana, this group also admitted to being heavy users of other drugs, such as alcohol. Thus, any differences between heavy and casual users in their reactivity to the test situation cannot be unequivocally associated with their usage of marijuana.

As an example of one of the problems that can arise in relating violent behavior to marijuana under conditions of polydrug usage, Kolb (1962) cited the case of two men who drank a considerable amount of whiskey, then smoked one marijuana cigarette, then began to quarrel and fight, resulting in the death of one of the men. When reported by the press, the crime was attributed to a vicious, marijuana-induced murder. More likely, these events were due to the effects of alcohol.

Besides the problem of polydrug use, one must also take into consideration the possibility that “street marijuana” may contain one or more other psychoactive substances, which in themselves could precipitate certain patterns of behavior considered to be antisocial.

Neurological

There is a great deal of evidence from the animal and the human literature indicating that specific neural mechanisms lying within
the temporal lobes and the limbic system are intimately involved in aggressive behavior (see reviews by Kaada, 1967; Kermani, 1969; Mark & Ervin, 1971; Moyer, 1968). Interestingly, the symptoms associated with temporal lobe epilepsy, which are often found to precede loss of impulse control and episodes of aggression (cf. Mark & Ervin, 1971), are superficially similar to the symptoms associated with marijuana intoxication. For example, among the symptoms common to both are a sense of depersonalization; paranoia; loss of recent memory and speech difficulties; intrusion of thoughts that occupy the center of awareness to the exclusion of all other conscious activity; changes in mood and affect, such as an increased sense of anxiety, terror, irritability; changes in visual, auditory, and tactile perception; and hallucinatory experiences.

Although it may seem rather farfetched to discuss temporal lobe epilepsy in the same context as marijuana intoxication, the number of symptoms common to both is intriguing. Also intriguing are the reports by Walton (1938) and Ames (1958) of two subjects who experienced general convulsions lasting several minutes, after taking marijuana. Involuntary jerking movements of the muscles, which sometimes extend throughout the whole body, have also been recently observed in subjects given Δ⁹-THC by Perez-Reyes and his colleagues (Perez-Reyes, Lipton, Timmons, Wall, Brine, & Davis, 1973). Although only a small percentage of epileptics are violent, there is clinical evidence that many of the individuals who do become violent as a consequence of using marijuana are also epileptics (Benabud, 1957; cf. Campbell, 1971; Keeler & Reifler, 1967; Keup, 1970). In this regard, Campbell (1971) reported a marked abnormality in the EEG recorded from the temporal lobe region of a group of patients suffering from cannabis-induced psychosis and suggested that increased activity in the temporal lobe may set off neural impulses in those areas of the brain that underlie feelings and behavior involved in aggression. Recently, Perez-Reyes and Wingfield (1974) reported a case in which an epileptic patient was treated with cannabidiol. Under the influence of the drug, abnormal EEG activity increased and persisted for some time after drug treatment was terminated. Spontaneous activity of neurons in the temporal lobe is, in fact, known to cause subjective feelings of rage and uncontrollable acts of violence (Gibbs, 1951; Treffert, 1964), and there are reports of a greater percentage of individuals charged as murderers who are also epileptics than would be expected by chance (Hill & Pond, 1952). In this regard, Mariacci (1963) found an association between violence, alcohol ingestion, and epileptoid seizures. On the basis of this association, he contended that drugs such as alcohol not only intoxicate but also facilitate temporal lobe epileptoid states in susceptible individuals. This conclusion was further supported by the observation that in many subjects who had committed acts of violence, alcohol brought about temporal lobe dysrhythmia under laboratory conditions. If a link could be established between the neurophysiological effects produced by cannabis and neural activity in a particular area of the brain, such as the temporal lobe, this locus of action could account for some of the isolated instances in which violence has been associated with use of marijuana.

**Response Predispositions**

O'Shaughnessy (1838) was one of the first investigators to note that "in persons of quarrelsome disposition it [cannabis] occasions, as might be expected, an exasperation of their natural tendency" (p. 422). More recently, it has been suggested that marijuana may lead to violent behavior if its use results in a lowering of inhibitions that normally restrain such behavior (Allentuck & Bowman, 1942; Bloomquist, 1968; Chopra, Chopra, & Chopra, 1942; Cordeiro de Farias, 1955; Freedman & Rockmore, 1946a, 1946b; Gaskill, 1945; Louria, 1966; Siler et al., 1933; Wolff, 1949; Yawger, 1938). This argument, relating loss of inhibitions to the occurrence of violence, rests on the premise that man is violent by nature and that without socially induced inhibitions, violence would be the general state of affairs in society (cf. Goode, 1970).
Although marijuana users themselves admit that their inhibitions tend to be reduced while they are under the influence of this drug (Tart, 1970)—a finding corroborated by testing individuals on the Rorschach and MMPI while they were under the influence of marijuana (Lord, 1971; Williams, Himmelsbach, Wikler, Ruble, & Lloyd, 1946)—this lowering of inhibitions is probably more verbal than behavioral (Grinspoon, 1971; Mirin et al., 1971). In other words, though the user may say things while under the influence of marijuana that he ordinarily would not say, he will not do things under the influence of marijuana that are foreign to his behavior. Survey evidence indicates that marijuana users, in fact, rarely lose control of themselves (Goode, 1970; Tart, 1970). Kolb (1962) has made the interesting observation that one of the most significant aspects of the data in police files dealing with marijuana is the absence of arrests for assault (cf. Robins, 1973). Thus, although a release of impulse control could conceivably result in violent behavior, the probability of such an occurrence depends as much on the individual as on any particular drug. This dependence on individual factors rather than drug factors is nicely illustrated by a study reported by DiMascio (1968) involving administration of barbiturates to two groups of subjects, one athletically inclined, the other esthetically and intellectually oriented. Following administration of secobarbital, the athletic subjects became irritable, confused, and exhibited impaired intellectual functioning. By contrast, the esthetic subjects became more calm and exhibited improved intellectual performance. In accounting for these observations, DiMascio argued that the athletic subjects found the motor-inhibiting effects threatening and reacted to this threat with anger and agitation, whereas the esthetic subjects found the effects relaxing.

Evidence from the psychiatric literature also indicates that individuals with preexisting behavioral disorders may become violent when intoxicated with marijuana (Andrade, 1964; Benabud, 1957; Pretoria Mental Hospital Medical Staff, 1938; cf. Bernhardson & Gunne, 1972; Keup, 1970; Klee, 1969; Wurmser, Levin, & Lewis, 1969). Although this does not necessarily mean that such behavior would not occur in the absence of marijuana, it does suggest that marijuana may precipitate such behavior in individuals who are already unstable. (This may also be true, of course, of alcohol and various other drugs.) According to their examination of 35 chronic marijuana users referred for psychiatric examination, Marcovitz and Myers (1944) concluded that such individuals are unable to endure "frustration, deprivation, or discipline from any authority. . . . The response of marihuana addicts to such situations is one of explosive aggression" (p. 387, cf. Ausubel, 1958; Lambo, 1965). Resentfulness toward authority was also a characteristic of a number of psychopaths who were also chronic marihuana users, studied by Charen and Perelman (1946). Such individuals often have histories of psychopathology and social deviance long before commencing drug use, which render them more likely to engage in both criminal activities and drug abuse (cf. Goodwin, Crane, & Guze, 1971). Charen and Perelman contend that individuals suffering from various behavioral disorders may simply be more prone to chronic use of drugs such as marijuana as a means of coping with inferiority feelings and their sense of resentment (cf. Gaskill, 1945). The fact that they use drugs such as marijuana may thus have little or nothing to do with the origins of their psychopathology or the kinds of behavior they engage in (cf. Bouquet, 1951), although in some cases it may exaggerate existing predispositions toward violence (cf. Bernhardson & Gunne, 1972; Gaskill, 1945; Gardikas, 1950; Yawger, 1938). Thus, individuals who are predisposed to using marijuana chronically may or may not also be individuals who are violent by nature.

There is also a certain amount of evidence from the animal literature (see review by Abel, 1974) suggesting that in combination with stress (e.g., food deprivation, cold, pain, sleep deprivation, withdrawal from morphine), cannabis can increase irritability and aggression (Alves, Goyos, & Carlini, 1973; Carlini & Gonzalez, 1972; Carlini, Hamazaki, & Martz, 1972; Carlini & Masur, 1970). Moreover, this effect appears to be specific to
cannabis, since it does not occur in conjunction with alcohol, amphetamine, amylbarbital, caffeine, LSD, or mescaline (Alves et al., 1973; Carlini & Masur, 1970). The animal studies also suggest that temperament may be another factor determining whether cannabis may induce aggressive behavior (Palermom-Neto & Carvalho, 1973). Although comparable studies have not been conducted with humans, these studies suggest that under certain circumstances, individuals experiencing constant stress may also become increasingly irritable and aggressive following use of marijuana.

Set and Setting

The user's immediate condition or set at the time of drug use is generally considered to affect how he behaves in response to the drug. Thus, whether an individual behaves violently after using marijuana may depend to a certain extent on whether he believes that marijuana precipitates violence (cf. Becker, 1953; Carlin, Post, Bakker, & Halpern, 1974; Jones, 1971; Tinklenberg, 1973). The belief that a drug will enhance feelings of masculinity, and with them the sense of aggressiveness, may also result in the occurrence of such behavior (cf. Tamerin and Mendelson, 1969).

A number of investigators have also suggested that marijuana could lead to violence in a naive user if he is unprepared for the subjective experiences engendered by the drug. These novel sensations, it is argued, could make the naive user extremely fearful (cf. Well, 1970), and if panic develops he could become assaultive (Bromberg, 1939; Louria, 1966). Although the bulk of evidence indicates that panic is not a common event even in naive individuals, there is not enough information available at present to dismiss this link between panic and aggressive behavior.

Another often-repeated suggestion is that marijuana may be used to bolster courage (Ausubel, 1958; Cordeiro de Farias, 1955; Dhnjibhoy and Bomb, 1930; Marcovitz and Myers, 1944; Miller, 1967). This notion has been challenged on the grounds that cannabis acts to sedate and quiet the user rather than alert him, and as such, it acts more as a deterrent than an inciter of antisocial behavior (cf. Chopra, Chopra, & Chopra, 1942; Hollister, Richards, & Gillespie, 1968; Mayor's Committee, 1944; Schofield, 1971). Some surveys of prison inmates also contradict this suggestion, since most of those who are familiar with the drug's effects state that they would not use marijuana beforehand if they anticipated engaging in violent behavior (Tinklenberg & Woodrow, 1974; cf., however, Blummer et al., 1967). There is some survey evidence, however, of 530 marijuana users indicating that a small percentage of individuals do use marijuana for the purpose of bolstering their courage (Chopra & Smith, 1974; Fisher & Steckler, 1974).

Regarding the contention that cannabis reduces anxiety and hence acts to increase courage (Lambo, 1965; cf. Blummer et al., 1967), the evidence is also equivocal, since in some individuals the drug acts to increase feelings of anxiety (Abel, 1971).

In addition to set and response predispositions, one must also take into consideration the interaction between the physiological changes produced by cannabis and the setting in which the drug is consumed (cf. Schachter & Singer, 1962). For example, marijuana is known to affect adrenal activity in animals (Lamprecht, Krettnansky, Ng, Williams, & Kopin, 1971; Welch, Welch, Messiha, & Berger, 1971) and to increase the release of adrenal epinephrine into the blood of humans (Hollister, Moore, Kanter, & Noble, 1970; Weiss, Watanabe, Lemberger, Tamarkin, & Cardon, 1972). On the basis of Schachter and Singer's (1962) research, one might expect that under such conditions of increased blood epinephrine levels, the subject would label his feeling according to the situation in which he finds himself. If marijuana were consumed in a situation not considered to be threatening or aggression laden, the user would not be likely to react aggressively.

Social Factors

Various authors have pointed out that one of the reasons that marijuana has been linked with criminal activities is that chronic mari-
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Juana use often occurs in urban slum areas, where delinquency rates also tend to be high (cf. Chopra et al., 1942; Ausubel, 1958; Barber, 1970; Brotman and Suffet, 1973; Indian Hemp Drugs Commission, 1893-1894). Cultural factors must, of course, be taken into account, since certain cultures within a community may inculcate norms, attitudes, and methods of coping with adversity that tend to emphasize or minimize aggressive behavior (e.g., Carstairs, 1954; Ilfeld, 1970). In this regard, chronic users of marijuana may be less concerned about the legality of drug use and therefore may be less attached to the legal system in general (cf. Brill et al., 1971; Goode, 1970). What this implies is that chronic use of substances such as marijuana is not a distinct social problem that is independent of other kinds of antisocial behavior. Other factors that warrant consideration in this regard are the age, race, and sex of the subject, since in many cases these variables are associated with different frequencies of drug use and violent behavior (cf. Goode, 1970; Hochman & Brill, 1973; Tinklenberg, 1973).

Summary and Conclusions

Although much has been written concerning the relationship between cannabis and violence, there is little unequivocal information bearing on this issue. The main impression from the available evidence is that in general, use of marijuana is not a major cause of aggression. This conclusion is in agreement with the overwhelming opinion of all governmentally sponsored commissions that have been specifically mandated to study the relationship between cannabis and violence (Indian Hemp Drugs Commission, 1893-1894; LeDain, 1972; Mayor's Committee, 1944; President's Commission on Law Enforcement, 1967; White House Conference on Narcotics, 1962; Wootton Linacre Report, 1968).

It should be emphasized, however, that this conclusion is based on the “typical” marijuana user and tends to underemphasize the at-risk individual who might, in fact, react violently as a consequence of exacerbation of preexisting difficulties involving impulse control. More often than not, such individuals have a prior history of violent behavior associated with poor impulse control, and the use of drugs such as marijuana may reduce inhibitory control even further.

Since it is a usual practice in laboratory experiments to screen subjects for possible psychiatric problems, such individuals rarely participate in controlled studies in which marijuana is being investigated. Hence, it is rarely the case that irritability or violence is observed under experimental conditions. Under natural conditions, however, such behavior may occur in certain of these individuals following use of marijuana, and if so, the only possibility of documenting such evidence is by the case history method and by examination of criminal records in which violence and marijuana are both mentioned at the time of arrest. Such records must be followed up, however, if the relationship between the two is to be unequivocally determined.

There is also the possibility that when taken in certain social conditions, cannabis may increase irritability and aggression. Although the evidence from studies of humans for this latter suggestion is indirect and equivocal, the literature from animal studies supports the idea that in combination with stress, cannabis can induce aggressive behavior.

The important question to keep in mind in any consideration of these problems, however, is whether such behavior is a unique consequence of marijuana use or whether these at-risk individuals would also be prone to violence should they use other drugs, such as alcohol. It is, of course, a rather trite suggestion to advise that more research be done to elucidate the issue of cannabis and aggression. Some directions that this might take have already been suggested, namely, direct experimental studies of situations in which use of cannabis may provoke violent behavior. Studies of the kind conducted by Schachter and Singer (1962), for example, would do much to elucidate the importance of set and setting as determinants in the response to cannabis. Further studies of how cannabis affects individuals with particular personality characteristics (e.g., introvert vs. extrovert)
or those characterized by particular behavioral disorders (e.g., poor impulse control) would also help to elucidate particular factors associated with the individual himself that may be of importance in affecting his response to this and other drugs. It is important to determine whether cannabis is unique in inciting aggressive behavior in certain individuals or whether such behavior would occur with other drugs as well. Also of considerable importance are the effects of chronic use of marijuana, since it is conceivable that chronic users may behave much differently than casual users. Such a possibility is suggested by many of the reports from non-Western societies.

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