I applaud the members of the State Assembly Committee on Health for holding this important public hearing regarding Assembly Bill 390 – which seeks to control and regulate the possession and use of marijuana by those age 21 years or older.

THE CASE FOR LEGALIZATION/REGULATION

Only through state government regulation will we be able to bring necessary controls to the marijuana market. By enacting state and local legislation on the use, production, and distribution of marijuana, state and local governments can effectively impose controls regarding:

* which citizens can legally produce marijuana;
* which citizens can legally distribute marijuana;
* which citizens can legally consume marijuana;
* and where, and under what circumstances, is such use legally permitted.

By contrast, the criminal prohibition of marijuana provides law enforcement and state regulators with no legitimate market controls. **This absence of state and local government controls jeopardizes rather than promotes public safety.**

HISTORY OF MARIJUANA USE

Humans have cultivated and consumed marijuana since virtually the beginning of recorded history. Cannabis-based textiles dating to 7,000 B.C.E have been recovered in northern China, and the plant’s use as a medicinal and euphoric agent date back nearly as far. In 2008, archeologists in Central Asia discovered over two-pounds of cannabis in the 2,700-year-old grave of an ancient shaman. After scientists conducted extensive testing on the material’s potency, they concluded, “[T]he most probable conclusion … is that [ancient] culture[s] cultivated cannabis for pharmaceutical, psychoactive, and divinatory purposes.”

Today over 17,000 studies pertaining to the marijuana plant, its unique active constituents (cannabinoids), and the human body’s own marijuana-like chemicals (endocannabinoids) exist in the scientific literature. We now know far more about cannabis than most foods we eat or
pharmaceutical drugs we ingest.

Just what exactly do we know? The consistent conclusion drawn by the available scientific literature is that **cannabis, when consumed in moderation by adults, poses little threat to public health.** We should regulate it accordingly.

**MARIJUANA’S IMPACT ON THE BODY**

The physical, therapeutic, and psychoactive effects one experiences after ingesting marijuana are derived primarily from a family of unique chemicals in the plant known as cannabinoids. Of the dozens of cannabinoids in marijuana, only one – THC – is significantly psychoactive. Most active chemicals in the plant possess therapeutic properties but do not induce euphoria. Some compounds, most specifically the cannabinoid cannabidiol (CBD) counteract the psychoactive properties of THC, acting as marijuana’s ‘anti-marijuana’ mechanism.

The reason a person experiences psychological, therapeutic, or physical effects after ingesting marijuana is because cannabinoids interact with individual receptors, so-called CB1 and CB2 receptors, located throughout the body. The CB1 receptors reside predominantly in the brain and regulate the drug’s psychoactive effects. The CB2 receptors are located throughout the human body, and are responsible for many of the cannabinoids’ therapeutic effects.

Because the majority of the body’s CB1 receptors are located in the frontal lobe region of the brain’s cerebral cortex (which regulates emotional behavior) and the cerebellum (a region in the back of the brain that primarily controls motor coordination), but not the brain stem (which controls life-preserving functions like breathing), **ingesting marijuana is believed to be pharmacologically incapable of causing a fatal overdose**, regardless of dosage or THC potency. According to a 1995 report prepared for the World Health Organization, “**There are no recorded cases of overdose fatalities attributed to cannabis, and the estimated lethal dose for humans extrapolated from animal studies is so high that it cannot be achieved by recreational users.**”

The specific psychological, therapeutic, and physical effects experienced after consuming marijuana vary from person to person, and many of these effects are dependent on the percentage of THC or other cannabinoids present in the marijuana consumed. Moreover, cannabis naive users tend to feel different effects compared with more experienced users. For example, if an inexperienced user consumes too much cannabis at one time, they may experience a mix of unpleasant physical and psychological feelings, such as a tachycardia (rapid heart beat), dry mouth, and a growing sense of paranoia. (These adverse effects are commonly referred to as a ‘panic attack.’) Fortunately these feelings, while mildly unpleasant, are only temporary and pose little-to-no actual long-term risk to the users’ health.

As a cannabis consumers become more experienced, they become more tolerant to some of the drug’s physical effects. Users also learn to better self-regulate (or ‘titrate’) their dosage to avoid any dysphoric symptoms such as paranoia. As a result, most experienced marijuana consumers describe the cannabis high as a pleasant experience that helps them to relax, socialize or unwind.

The National Organization for the Reform of Marijuana Laws (www.norml.org)
Recently, investigators at the University of Alberta, Canada, conducted a series of lengthy interviews with male and female cannabis consumers to better determine why adults use marijuana. They reported that the majority of individuals who use cannabis recreationally do so to “enhance relaxation.” Researchers concluded: “[M]ost adult marijuana users regulate use to their recreational time and do not use compulsively. Rather, their use is purposively intended to enhance their leisure activities and manage the challenges and demands of living in contemporary modern society. Generally, participants reported using marijuana because it enhanced relaxation and concentration, making a broad range of leisure activities more enjoyable and pleasurable.”

MARIJUANA USE VERSUS ALCOHOL USE

Throughout history, alcohol and marijuana have been the two most popular social relaxants consumed by western civilizations. Yet the risks posed by marijuana and alcohol – both to the individual consumer and to society as a whole – are far from equal. For example, a 2009 report published in the British Columbia Mental Health and Addictions Journal Visions estimated, “In terms of [health-related] costs per user: tobacco-related health costs are over $800 per user, alcohol-related health costs are much lower at $165 per user, and cannabis-related health costs are the lowest at $20 per user.”

Why the dramatic discrepancy? Quite literally, alcohol is an intoxicant; cannabis is not.

The word intoxicant is derived from the Latin noun, toxicum, meaning: "a poison." It's an appropriate description for booze. Alcohol is toxic to healthy cells and organs, a side effect that results directly in some 35,000 deaths per year from illnesses like cirrhosis, ulcers, and heart disease. Furthermore ethanol, the psychoactive ingredient in beer, wine, and hard liquor, is carcinogenic. Following ethanol's initial metabolization by the body it is converted to acetaldehyde. This is why even moderate drinking is positively associated with increased incidences of various types of cancer, including cancers of the breast, stomach, liver, esophagus, and pancreas. Heavy alcohol consumption can depress the central nervous system – inducing unconsciousness, coma, and death – and is strongly associated with increased risks of injury. According to the U.S. Centers for Disease Control, alcohol plays a role in about 41,000 fatal accidents per year. Alcohol consumption also plays a primary role in the commission of acts of violence. In fact, according to the federal Bureau of Justice Crime Statistics, alcohol consumption plays a role in the commission of approximately one million violent crimes annually.

By contrast, cannabinoids are remarkably non-toxic. Unlike alcohol, marijuana is incapable of causing fatal overdose and its use is inversely associated with aggression and injury. Unlike alcohol, the use of cannabis is not linked to increased risk of mortality or various types of cancer – including lung cancer – and may even reduce such risk. For instance, a 2009 study in the journal Cancer Prevention Research reports that moderate use of marijuana is associated with "a significantly reduced risk of head and neck squamous cell carcinoma."
A separate 2006 population case-control study, funded by the U.S. National Institutes of Health and conducted by the University of California at Los Angeles, also reported that lifetime use of cannabis was not positively associated with cancers of the lung or aerodigestive tract, and further noted that certain moderate users of the drug experienced a reduced cancer risk compared to non-using controls.\textsuperscript{xii} Finally, a 1997 retrospective cohort study of 65,000 examinees by Kaiser Permanente concluded, “\textbf{Compared with nonusers/experimenters (lifetime use of less than seven times), ever- and current use of marijuana were not associated with increased risk of cancer, [including] … tobacco-related cancers or with cancer of the following sites: colorectal, lung, melanoma, prostate, breast, [or] cervix.}”\textsuperscript{xiii}

\textbf{MARIJUANA’S IMPACT ON THE BRAIN}

There is little scientific evidence to substantiate the notion that marijuana use permanently or significantly damages the brain. In adults, \textit{cannabis consumption is not associated with residual deficits in cognitive skills, as measured by magnetic resonance imaging, neurocognitive performance testing, or fMRI imaging.}

Most recently, Harvard Medical School researchers performed magnetic resonance imaging on the brains of long-term cannabis users (reporting a mean of 20,100 lifetime episodes of smoking) and controls (subjects with no history of cannabis use). Imaging displayed “no significant differences” between heavy marijuana smokers compared to non-smokers.\textsuperscript{xiii}

Additional clinical trials have reported similar results. An October 2004 study published in the journal \textit{Psychological Medicine} examined the potential adverse effects of marijuana on cognition in monozygotic male twins. It reported “an absence of marked long-term residual effects of marijuana use on cognitive abilities.”\textsuperscript{xiv} Likewise, a 2002 clinical trial published in the \textit{Canadian Medical Association Journal} determined, “Marijuana does not have a long-term negative impact on global intelligence.”\textsuperscript{xv}

Though a handful of studies have reported that long-term users sometimes perform differently than non-users on certain cognitive tests immediately after ceasing their cannabis use, these same studies report that both former users and non-users test similarly within a matter of days. Notably, a 2001 study published in the journal \textit{Archives of General Psychiatry} found that long-term cannabis smokers who abstained from the drug for one week "showed virtually no significant differences from control subjects (those who had smoked marijuana less than 50 times in their lives) on a battery of 10 neuropsychological tests." Investigators further added, \textit{“Former heavy users, who had consumed little or no cannabis in the three months before testing, [also] showed no significant differences from control subjects on any of these tests on any of the testing days.”}\textsuperscript{xxv}

\textbf{MARIJUANA’S IMPACT ON DRIVING PERFORMANCE}

While it is well established that alcohol consumption increases motor vehicle accident risk, evidence of marijuana’s culpability in on-road driving accidents and injury is nominal by comparison.
Numerous on-road and traffic simulator studies report that cannabis’ psychomotor impairment is seldom severe or long lasting, and variations in driving behavior after marijuana consumption are noticeably less pronounced than the impairments exhibited by drunk drivers.

Unlike motorists under the influence of alcohol, individuals who have recently smoked cannabis are aware of their impairment and try to compensate for it accordingly, either by driving more cautiously or by expressing an unwillingness to drive altogether.\textsuperscript{xvii} As noted in a 2008 Israeli study assessing the impact of marijuana and alcohol on driving performance, “[S]ubjects seemed to be aware of their impairment after THC intake and tried to compensate by driving slower; alcohol seemed to make them overly confident and caused them to drive faster than in control sessions.”\textsuperscript{xviii}

A previous review by Toronto’s Centre for Addiction and Mental Health reached a similar conclusion, finding: “[S]ubjects who have received alcohol tend to drive in a more risky manner. The more cautious behavior of subjects who have received marijuana decreases the impact of the drug on performance, whereas the opposite holds true for alcohol.”\textsuperscript{xx}

In closed course and driving simulator studies, marijuana’s acute effects on driving include minor impairments in tracking (eye movement control) and reaction time, as well as variation in lateral positioning, headway (drivers under the influence of cannabis tend to follow less closely to the vehicle in front of them), and speed (as previously noted, drivers tend to decrease speed following cannabis inhalation).\textsuperscript{xx} A handful of studies have reported a positive association between very recent cannabis exposure and a gradually increased risk of vehicle accident, though this increased risk is far lower than the risk presented by the consumption of even small amounts of alcohol.

For example, a 2007 case-control study published in the \textit{Canadian Journal of Public Health} reviewed 10-years of US auto-fatality data. Investigators found that U.S. drivers with blood alcohol levels of .05, a level below the legal limit for intoxication in the United States, experienced an elevated crash risk that was more than three times higher than individuals who tested positive for marijuana.\textsuperscript{xxi} A prior review of auto accident fatality data from France reported similar results, finding that drivers who tested positive for any amount of alcohol had a four times greater risk of having a fatal accident than did drivers who tested positive for marijuana.\textsuperscript{xxii} Both studies noted that, overall, few traffic accidents appeared to be attributed to driver’s operating a vehicle while impaired by cannabis.

Under current California law it is illegal for any diver to operate a vehicle if impaired by cannabis. Such drivers would continue to be prosecuted under Assembly Bill 390.

\textbf{MARIJUANA REGULATION PROMOTES PUBLIC SAFETY}

Marijuana is not a harmless substance – no potentially mind-alarming substance is. But this fact is precisely why its commercial distribution ought to be controlled and regulated by the state in a manner similar to the licensed distribution of alcohol and cigarettes – two legal substances that cause far greater harm to the individual user and to society as a whole than cannabis ever could.
Working to Reform Marijuana Laws

The above findings demonstrate that any risk presented by marijuana smoking falls within the ambit of choice we should permit the individual in a free society. Therefore NORML supports the establishment of a taxed and regulated marijuana market, as proposed under Assembly Bill 390. Passage of AB 390 would give greater control to state law enforcement officials and regulators by imposing proper state restrictions and regulations on this existing and widespread marijuana market.

### END ###

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