second-hand marijuana smoke for at least 3 hours. (Rohrich J. J Anal Toxicol 2010;34(4):196-203) ***Emotional health****:* According to the National Institute on Drug Abuse, the main effects of marijuana on mood include euphoria, calmness, anxiety, and/or paranoia. Other short-term psychological effects include a distorted sense of time, magical or "random" thinking, short-term memory loss, and depression. These psychological problems generally ease after a few hours but residual effects can last for days.

***Seizures:*** In most users, THC is a pro-seizure drug inducing new onset of seizures. However, this is a very controversial issue and the results of scientific studies are mixed: some report that smoking marijuana may precipitate seizures while others report that marijuana suppresses seizures. There may not be a clear answer to this question because of the variability of the contents and concentration of psychoactive substances in marijuana and the psychological differences between people.

***Red-eye and vision problems****:* The eye tissues contain cannabinoid receptors and exposure to cannabinoids induces corneal vasodilatation resulting in “red eye”. Cannabinoid exposure also has short-term and long-term effects on visual acuity and causes alterations in color discrimination and an increase in sensitivity to light. (Kiplinger et al. Clin Pharm & Therapeutics 1971;12:650-657). Long term-marijuana users, even after abstaining for as long as 10 years, tend to have an increase in sensitivity to light and a decrease in dark adaptation, color matching and visual acuity. (Dawson et al. Invest Opthalmol Vis Sci 1977;16:689-699)

***Stillbirths*:** Exposure to marijuana, including exposure to second-hand marijuana smoke, during pregnancy has been shown to increase the risk of stillbirth *(Varner M. Ob Gyn 2014;123(1);113-125)*. The study documented that blood THC levels even below the 3 ng/ml threshold of “intoxication” is detrimental to the unborn child. Blood levels of THC above 3.5ng/ml have been repeatedly documented in people exposed to second-hand marijuana smoke for at least 3 hours. (Rohrich J. J Anal Toxicol 2010;34(4):196-203)

*Long-term health consequences of using marijuana*

***Dental health****:* Using marijuana is associated with the development of periodontal dental disease. This effect occurs in people who smoke marijuana; ingest marijuana, and who only use the drug occasionally. The periodontal effects are related to the negative systemic effects of cannabis on the immune system. (Ashton CH. Br J Psychiatry 2001;178:101-106) High frequency users have more severe periodontal disease causing inflammation of the gums leading to loosening of the teeth from the gums and underlying bone resulting in early loss of teeth. (Thompson et al. JAMA, 2008;299(5):525-531) Cannabis use has also been linked to several other oral and dental problems including fiery-red gingivitis, gingival overgrowth, inflammation of the uvula and benign and cancerous oral tumors.

***Cardiovascular events:*** There have been an increased number of reports of cardiovascular complications in young people. There are multiple case reports of atrial fibrillation in children and adults following exposure to cannabis (Singh et al. Pediatrics 2014;133(2):e443-

446, Korantzopoulos et al, Am J Card 2014;113(6):1085-1086). In addition, cannabis use is associated with cardiovascular complications. A recent report from France, where reactions to substance abuse must be reported, revealed that from 2006-2010 1.8% of all cannabis-related sequella were cardiovascular, including acute coronary syndromes, peripheral arteriopathies (Buerger-like diseases {thromboangiitis obliterans}) and cerebral complications (Jouanjus et al, J Am Heart Assoc. 2014;3:e000638).

***Emphysema and spontaneous pneumothorax****:* The known consequences of chronic marijuana smoking include chronic cough, sputum production, wheezing and high frequency of acute bronchitis (Taylor et al, Addiction 2000;95:1669-1677). Spontaneous pneumothorax has also been reported to be the presenting symptom of bullous emphysema in otherwise healthy asymptomatic young adults who chronically smoke marijuana but not tobacco. The bullae appear at the apex of the lung with no signs of emphysema of the entire lung. Chronic marijuana use should now be included in the differential diagnosis of pneumothorax (Beshay

M et al, European Journal of Cardio-Thoracic Surgery, 2007; 32:834-838).

***Hyperemesis syndrome****:* The cannabinoid hyperemesis syndrome may occur following frequent use of marijuana for several months or years. Essential clinical criteria for the diagnosis include 1) history of regular cannabis use, 2) severe nausea, 3) vomiting that recurs in a cyclic pattern over months and 4) resolution of symptoms after stopping cannabis use. Supporting features for the diagnosis include (1) compulsive hot baths with symptom relief, (2) colicky abdominal pain, and (3) no evidence of gall bladder or pancreatic inflammation. (Simonetto, DA et al. *Mayo Clinic Proceedings* 2012;87(2):114–9).

***Risks to family, job, and safety as a result of using marijuana:*** Inadvertent exposure to THC either through exposure to second hand smoke, accidental ingestion of marijuana-edibles or contact with marijuana buds during the drying process may pose a significant health threat to innocent by-standers. As noted, exposure to second hand smoke results in increased blood levels of THC with all the consequences of inhaling or ingesting marijuana. There are numerous reports in the medical literature about accidental childhood THC poisoning resulting in hospitalization, including the necessity of ICU care. (Wang, GS. JAMA Pediatr 2013; 167(7):630-633 and Molly C. Arch Pediatr. 2012; 19(7):729-732). Family members and friends, especially children, who have a history of asthma, are prone to severe asthma attacks following exposure to marijuana smoke by either inhalation or contact with contaminated clothing. THC in marijuana buds is volatile (forms a gas) and exposure to buds during the drying process can result in increased blood levels of marijuana. (Ross SA. J Nat Prod 1996; 59(1):49-51)

Marijuana may be detected in the urine for at least 30 days after using marijuana or after exposure to second-hand smoke. The more often someone smokes, the longer THC stays in one’s system. The THC detected in urine for employment testing is for the metabolite of THC, known as THC-COOH and is non-active. There is an allowable amount of 50 nanograms of the THC metabolite before someone has failed the drug test. Employers have the right to perform random drug tests on employees. Positive tests may cause a person to be unemployable.

The National Highway Traffic Safety Administration (www.NHTSA.gov) has extensively studied the effects of marijuana on driving. Marijuana impairs driving for up to 3 hours after use and results in:

* Decreased car handling performance
* Increased reaction times
* Impaired time and distance estimation
* Motor in-coordination
* Decrease vigilance

***Mental health disorders- chronic depression and schizophrenia****:* Short-term psychological effects include a distorted sense of time, magical or "random" thinking, short-term memory loss, and depression. These psychological problems generally ease after a few hours but residual effects can last for days. There is a significant and consistent relationship between marijuana use and the development of schizophrenia and chronic depression. The results of scientific studies showing an association between marijuana use and these mental disorders are alarming. A prevalence rate of persistent depression as high as 40% in chronic marijuana smokers has been reported (Brook JS. Psychol Rep 2011; 108(2):339-357). A 2004 article in the British Journal of Psychiatry reviewed 4 large studies, all of which showed a significant and consistent association between consumption of marijuana, mostly during teenage years or early 20s, and the later development of schizophrenia. The review concluded that marijuana is a "causal component" in the development of schizophrenia and other psychotic disorders. (Caspi et al., Biol Psychiatry, May 2005.) The mechanism of action is not clear but some studies implicate sudden depletion of dopamine or alterations in the dopamine receptor. (Strejilevich SA et al. Med Hypotheses 2012;78(1):107-112) In addition, a number of well-designed scientific studies have shown an association between chronic marijuana use and increased rates of chronic depression and schizophrenia in people with abnormalities of the *COMT* gene. Variations in the *COMT* gene are present in 1:4000 live births (Zammit et al. Br J Psychiatry 2011;

199(5):380-385).

***Learning problems and school performance/job performance****:* Early initiation and continued use of marijuana affects memory, attention and ability to think clearly, making it difficult to concentrate, learn new things, and make sound decisions (Dougherty DM et al, Psychopharmacology 2013;226(2):307-319). As a result, school performance is impaired, increasing number of absences and increasing the risk of dropping out of school. In Washington State, the Healthy Youth Survey results for 2012 found that high school students who used marijuana were more likely to get lower grades in school (Cs, Ds, or Fs) compared to those that do not use. While it is difficult to distinguish whether this is due to learning difficulties, lack of motivation, or because marijuana users mix with peers who may be involved in a range of risk taking behaviors, using marijuana at an early age is independently associated with learning problems. (Crean RD et al. J Addict Med. 2011;5(1):1-8).

***Loss of IQ:*** Recent reports show that fewer teens and young adults believe that cannabis is harmful to health. Concomitantly they are beginning to use cannabis at a younger age and more frequently (daily cannabis). In view of this change in behavior a long-term epidemiological study was performed using data collected on over 1000 participants over a 38 year period. The results revealed that users had more cognitive problems and a decline in IQ over the study period (average 8 points). The problems were more severe in users who started marijuana during adolescence and in more persistent users. (Meier M. Proc Natl Acad Sci USA 2012;109(40):E26572664). Other studies have confirmed that teens who are chronic marijuana users have reduced problem solving skills and exhibit

“cognitive inflexibility.” (Egerton A et al. Neuropsychopharmacology 2005;30(10):1895-18905).

***Memory loss and changes in brain structure:*** Persistence use of cannabis in adolescents is associated with defects in both acute and long term memory. Researchers have suggested that these defects are related to changes in synaptic function within the cortico-basalganglio-thalmic circuits that play an important role in memory. This circuitry includes the striatum, globus pallidus and thalamus (S-GP-T). These areas contain a dense population of CB1 receptors. A recent controlled study of patients with poor memory function, who were part of a larger cross-sectional neurobiological study of schizophrenia, and who persistently smoked marijuana underwent MRI brain surface mapping. This unique study compared findings in 4 groups of patients with poor memory function documented by neuropsychological testing: the groups included 2 populations, one with schizophrenia and one without schizophrenia. The groups were subsequently divided into 2 subsets, those who were addicted to smoking marijuana (but did not use marijuana for the preceding 6 months), and those who never used marijuana. It is known that patients with schizophrenia exhibit structural changes in the S-GP-T. These same changes were present in study patients who did not have schizophrenia but chronically smoked marijuana and were most severe in schizophrenic patients who smoked marijuana (Smith MJ et al., Schizophrenia Bulletin 2014;40:287-299).

***Withdrawal:*** THC is a fat-soluble drug and therefore stays in the body fat much longer than other drugs. Withdrawal symptoms include anxiety, tremor, aches and pains, sleep problems and craving of the drug. Restlessness, irritability, and insomnia can occur in heavy users.

*Effects of prenatal exposure to marijuana on infants and children*

***Acute effects:*** Exposure to marijuana, including exposure to second-hand marijuana smoke, during pregnancy has been shown to increase the risk of stillbirth 2-fold. (Varner M. Ob Gyn 2014;123(1):113-125). The study documented that blood THC levels even below the 3 ng/ml threshold of “intoxication” are detrimental to the unborn child. Blood levels of THC above 3.5ng/ml have been repeatedly documented in people exposed to second-hand marijuana smoke for at least 3 hours. (Rohrich J. J Anal Toxicol 2010; 34(4):196-203).

***Long-term effects of prenatal exposure on infants and children:*** Prenatal exposure to marijuana has been associated with numerous problems in the infant. Infants may have a “high pitched cry” of the type potentially associated with developmental delay. Some research suggests that infants may also have a T-cell immune defect. The developing fetal endocannabinoid system is vulnerable to maternal marijuana. A recent scientific study links fetal exposure to an increased risk for aggressive behavior and attention problems as early as 18 months of age. (Marroun EL. Drug Alcohol Depend 2011; 118(2-3):470-474). The relationship between prenatal marijuana exposure and long-term school achievement has also been examined. As a group prenatally exposed children performed below non-exposed peers on standard intelligence tests at age 6 years, showed attention problems and depression at age 10 years and performed poorly on standardized tests to measure reading, spelling, and mathematics reasoning at age 14 years.

(Goldschmidt L. Neurotoxicol Teratol 2012; 34(1):161-167)

***Natal Exposure/Breast Feeding:*** Current evidence indicates that cannabis use during breastfeeding adversely affects the infants’ neurodevelopment and impacts neuropsychiatric, behavioral, and executive functioning. The effects on learning and behavior may influence future adult productivity and outcome. Women using cannabis during lactation should be advised about what is known and encouraged to stop using. (Jaques et al, J. Perinatol 2014, doi 10.1038/jp.2013.180)

***Accidental intoxication in infants and children:*** Infants and children may be accidentally exposed to THC through exposure to second hand smoke, volatilization of THC during drying of the marijuana plant (buds) or ingestion of marijuana edibles. In February 2013, the National Institute on Drug Abuse published statistics confirming an increase in marijuana use among teens which is now at a 5 year high. More worrisome is the report by Wang and colleagues in July 2013. Medical toxicologist George Wang and his colleagues at the Rocky Mountain Poison and Drug Center in Denver published a study about pediatric marijuana poisonings. "We are seeing increases in exposure to marijuana in young pediatric patients, and they have more severe symptoms than we typically associate with marijuana," Wang said "We hadn't seen these exposures before the big boom of the medical marijuana industry.” At children’s hospital there were a total of 1378 patients younger than 12 years evaluated for unintentional ingestions during the retrospective study group from January 2005 to the end of 2011. Of those cases, there were 0 of 790 cases due to ingestion of marijuana prior to the law’s change and 14 of 588 cases after the law changed on Sept. 30, 2009. (Wang et al, JAMA Pediatrics.

2013;167(7):630-633*).*

**Drug Paraphernalia**

Most people consider drug paraphernalia to be pipes, bongs and syringes, but it can be many things. It can be ordinary items used to disguise or hide the drug or things used to consume the drug. Aluminum foil, small ziplock baggies, pill bottles, spoons, film canisters, cigarette packs, hide-a-cans, makeup kits, gum wrappers, mint tins, liquid breath mint containers, or small glass vials are types of paraphernalia. Parents need to be aware that these kinds of things are either used to conceal the drug or a way of using the drug. Paraphernalia means drug user.

**The following is paraphernalia associated with the use of specific drugs:**

Ecstasy:

* pacifiers, lollipops, mouth guards for grinding of the teeth
* glow sticks, surgical masks and mentholated rubs to over stimulate the senses
* water bottles used to bring in alcohol or liquid drugs like GHB, LS

Cocaine:

* glass pipes for smoking crack
* small mirrors and razorblades, rolled dollar bills or cut straws for snorting
* spoons and lighters, syringes, turnicate, cotton pieces

Heroin:

* kits containing – spoons, bottle caps, lighters, syringes, turnicate, cotton pieces, small baggies
* balloons, baggies, burnt aluminum foil, burnt spoons, bottle caps
* scales, razor blades with powder residue, cut straws, needles
* toilet paper rolls filled with dryer sheets – absorb odor from smoking

Marijuana:

* rolling papers, small baggies, stash cans, film canisters, tins and roach clips
* deodorizers, incents, potpourri to disguise or mask the odor of marijuana
* pipes –metal, colored blown glass, ceramic large bongs
* brown dryer sheets – kids’ stuff them in an empty TP roll and exhale smoke into it

Methamphetamine:

* small plastic baggies
* small cosmetics bags (to keep paraphernalia in)
* pocket knives
* Q-tips
* Cut straws
* Pocket torches
* Glass pipes
* Razor blades
* Mirrors

Inhalants:

* tubes of modeling glue or super glue
* empty spray cans, small CO2 cartridges
* plastic & paper bags, balloons, tops cut off of liter bottles
* bottle or cans with pens or tubing punctured in the sides

Things used to cover up the use of drugs:

* mouthwashes, breathe sprays, mints
* eye drops to conceal bloodshot eyes
* breathe mint droppers and eye drop containers to conceal LSD and GHB
* wearing sunglasses at inappropriate times

**Behaviors**

People’s behaviors and personalities change when things are happening in their lives, if someone is going thru a divorce or breakup, a child is ill, a family member passes away, they lose their job, etc. Supervisors and employers need to be able to determine if it a personal issue, a bad day, or possible substance abuse. The same goes for your children. Is your kid just having a bad day at school, or fighting with a friend, or is something else going on? When you notice behavioral changes in your child, you want to be able to identify if it is adolescent stress or typical growing pains or is it something else like drug use. When you are trying to figure out what your child has been up to it is important to use and trust your senses.

**What do you see?** Look at the person. Are their eyes red and having problems focusing? They may have been drinking. Are their pupils dilated or constricted? Are the agitated? Are they breathing normal? Is there a strange burn on their mouth or fingers? That could signify smoking something through a metal or glass pipe, or they are huffing Dust Off. Have they developed nosebleeds? This can be indicative of cocaine use. Are they wearing long sleeves even in the middle of summer? This is a way to hide track marks from intravenous drug use.

**What do you smell?** Marijuana, cigarettes, Inhalants (chemical odor), and alcohol all have tell tales odors. Whether you notice the odor on the breath or clothes, it is a reason to be alarmed; for teens, simply being around others who drink or smoke makes it more likely your child will try it. Do not be afraid to follow your nose. Excessive “pleasant” smells, like breathe mints, heavy perfumes, laundered clothing (for a child who never does their own wash) can be telltale signs of them trying to cover up or mask odors. If you have teenagers, make sure you look in, and smell, their car – the smell of stale beer and marijuana can linger in the upholstery.

**What do you hear?** Listen to the clues the person is giving you by the things being said, the things they laugh at or the fact they may not be saying anything at all. Silence can speak volumes about something going on in the person’s life. By listening, over time you will be able to identify which behaviors are the results of bad days, mood swings or something more serious. Are they slurring their word? Are they speaking low and raspy or high pitched and fast? Are they able to follow the conversation? Are they taking a long time to answer? By using all your senses along with your gut instinct, you will be able to determine certain behavior as typical or indicative of drug use.

**Other signs that may indicate drug use:**

* Stories do not add up and social circles change
* Schoolwork goes downhill
* Increased lying and stealing



**Resources:**

Urban Dictionary is an app for smart phones, tablets and computers and is useful for defining drug related words and street terms. After entering a term or word, if the word is part of the drug-jargon, the meaning will pop up within the top 3 responses and give all details about the word or terminology. <http://www.urbandictionary.com/>

EcstasyData.org is an independent laboratory pill testing program run by Erowid Center, and co-sponsored by Dancesafe and Isomer Design. Launched in July 2001, its purpose is to collect, review, manage, and publish laboratory pill testing results from a variety of organizations. <https://www.ecstasydata.org/>

Parents Opposed to Pot: nationwide organization providing factual information about the effects marijuana has on users, families, and society. They have testimonial from parents whose children have been affected by Marijuana. Their website is <http://www.poppot.org/>Facebook: <https://www.facebook.com/poppotorg>

Moms Strong: A national group of moms who share their stories of addiction and marijuana <http://momsstrong.org/>

Dr. Christian Thurstone is one of fewer than three dozen physicians in the United States who are board certified in general, child and adolescent and addictions psychiatry. He is medical director of one of Colorado’s largest youth substance-abuse-treatment clinics and an associate professor of psychiatry at the University of Colorado Denver, where he conducts research on youth substance use and addiction. <http://drthurstone.com/>

Feel free to contact Katie Wells, Manager of Adolescent Substance Use Disorder Programs for the Division of Behavioral Health, Substance Use Disorders Section, at (303) 866-7501 or by email katie.wells@state.co.us. Website for treatment:

[www.linkingcare.org](http://www.linkingcare.org/)