

# Alcohol and Drug Statistics and Evaluating Impairment Risk

## Alcohol and Drug Use in the United States

Alcohol and drugs are used across all age groups in the US. Substance use and dependency in the workplace cause lost time from work, increased job turnover and healthcare issues. Employees with an untreated substance abuse disorder cost companies more than \$3200/year.<sup>1</sup>

### Alcohol and Drug Use by Age<sup>1</sup> (2017, Month is the last month of survey)

#### All People

	Age 18 to 25 (%)		Age 26 to 34 (%)		Age 35 and Older (%)	
	Month	Year	Month	Year	Month	Year
Alcohol Use	56.3	74	64	80	53.9	67.1
Binge Alcohol Use*	36.9	N/A	37	N/A	21.9	N/A
Heavy Alcohol Use*	9.6	N/A	9	N/A	5.6	N/A
Marijuana	22.1	34.9	14.8	23.4	6.3	9.6
Other Drugs**	2.1	4.5	2.6	5.3	1.4	3.6

\* Binge Alcohol Use is five or more drinks (males) or four or more drinks (females) at the same time or within a couple of hours of each other on at least 1 day in the past 30 days. Heavy Alcohol Use is defined as binge drinking on the same occasion on 5 or more days in the past 30 days; all heavy alcohol users are also binge alcohol users.

\*\* Includes misuse of prescription psychotherapeutics, cocaine, crack, heroin, hallucinogens, inhalants, or methamphetamine.

### Employee Alcohol and Drug Use by Age<sup>1</sup> (2017, Month is the last month of survey)

#### Full Time Employees

Substance	Age 18 and Older (%)		Aged 18-25 (%)		Age 26 and Older (%)	
	Month	Year	Month	Year	Month	Year
Alcohol	65	78.8	66.9	82.2	64.7	78.3
Illicit Drugs*	12.1	58.5	24.7	62.1	10.5	58.1
Marijuana	10.4	16.6	22.5	35.6	8.8	14
Cocaine	0.9	2.6	2.2	7	0.8	2
Methamphetamine	0.2	0.5	0.3	1.1	0.2	0.4
Opioid Misuse	1.3	4.6	1.9	7.5	1.3	4.2

\* Illicit Drugs include prescription psychotherapeutic, marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, or methamphetamine.

## Part Time Employees

Substance	Age 18 and Older (%)		Aged 18-25 (%)		Age 26 and Older (%)	
	Month	Year	Month	Year	Month	Year
Alcohol	58	72.9	55.2	74.4	58.9	72.4
Illicit Drugs*	14.8	55	26.1	58	10.6	54
Marijuana	13	19.7	24.3	38.1	8.8	13
Cocaine	1	2.9	1.9	6.4	0.7	1.6
Methamphetamine	0.3	0.6	0.4	0.7	0.2	0.5
Opioid Misuse	1.5	4.6	1.6	6.9	1.4	3.7

\* Illicit Drugs include prescription psychotherapeutic, marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, or methamphetamine.

## Alcohol and Drug Use Cost<sup>2</sup> (Based on 1000 employees)

Industry	Total Annual Cost	Lost Time from Work	Job Turnover and Re-Training	Healthcare Cost
Construction	\$409,098	\$163,200	\$131,550	\$114,348
Mining	\$474,292	\$114,845	\$260,899	\$ 96,488
Transportation, Utilities	\$220,998	\$ 29,100	\$105,975	\$ 85,848
Manufacturing, Durable	\$340,428	\$138,012	\$113,148	\$ 89,268
Manufacturing, Nondurable	\$364,068	\$118,800	\$157,440	\$ 87,748
Agriculture	\$151,432	\$ 17,286	\$ 44,032	\$ 90,028
Education, Health, Social Services	\$242,308	\$ 54,720	\$105,920	\$ 81,668
Professional, Mgmt., Admin.	\$498,085	\$271,611	\$129,986	\$ 96,488
Other Services*	\$361,065	\$ 64,206	\$206,364	\$ 90,408
Information, Communications	\$862,254	\$373,353	\$394,693	\$ 94,208

\* Does not include Public Administration

## Substance Dependence<sup>2</sup> (Individuals may be dependent on more than one substance)

Industry	Employee Substance Dependence (%)				
	All Employees	Alcohol	Marijuana	Opioids and Heroin	Other Drugs
Construction	15.0	12.4	2.3	1.1	4.4
Mining	10.3	9.6	0.1	0.9	1.0
Transportation, Utilities	7.5	6.6	0.9	0.6	1.7
Manufacturing, Durable	8.4	7.5	0.6	0.6	1.5
Manufacturing, Nondurable	8.0	6.7	1.1	0.7	2.1
Agriculture	8.6	7.5	1.2	0.4	1.7
Education, Health, Social Services	6.4	5.4	1.0	0.5	1.5
Professional, Mgmt., Admin.	10.3	8.6	1.6	0.8	2.7
Other Services*	8.7	7.1	1.6	0.9	2.5
Information, Communications	10.7	8.2	1.4	5.0	2.3

\* Does not include Public Administration

## Alcohol and Drug Used Together

After alcohol, marijuana is the most commonly used drug in the workplace. More than 80% of regular drug users in the workplace use marijuana<sup>1</sup> and marijuana and alcohol are frequently taken together.

Workers with alcohol problems are 2.7 times more likely to have injury-related absences than workers without drinking problems.<sup>3</sup> A hospital emergency room study found that 35% of patients with an occupational injury were at-risk drinkers and in 11% of workplace fatalities victims had been drinking.<sup>3</sup>

Even when a company has a zero-tolerance drug policy and only hires people who pass a pre-employment drug test, marijuana use can still be an issue. A study highlighting issues with regular marijuana use reviewed pre-employment drug test data and found that employees with a marijuana-positive urine samples had 55% more industrial accidents, 85% more injuries, and 75% greater absenteeism compared with those who tested negative for marijuana use.<sup>4</sup>

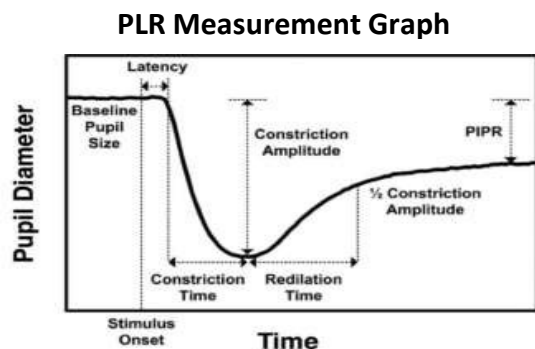
Combining alcohol and drugs increases impairment. A study of driver fatalities found that combining alcohol and drugs increased the chance of a fatality by approximately 70% over alcohol alone.<sup>5</sup>

### Percent of Alcohol Users who Use Alcohol and Drugs in the Same Month or at the Same Time<sup>1</sup> (2017 Survey, Month is the last month of survey)

Drugs consumption by alcohol users	Use in the Same Month (%)		Use at Same Time or within 2 Hours – Most recent use in month (%)	
	Age 18-25	Age 26+	Age 18-25	Age 26+
Marijuana	32.2	11.1	17.1	5.3
Cocaine and Crack	3.3	1.4	0.9	0.3
Heroin	0.3	0.2	0.1	0.1
Hallucinogens	2.7	0.5	0.3	0
Methamphetamine	0.5	0.3	0.2	0.1

## Pupillary Light Reflex (PLR) Testing for Alcohol and Drug Impairment

PLR is an involuntary reflex that controls the eye's pupil in response to changing light intensity. Consumption of alcohol or drugs can result in PLR changes. Studies of alcohol consumption and PLR<sup>6, 7, 8</sup> have evaluated changes in PLR with increasing blood alcohol concentration (BAC) levels. Pupil diameter, latency, and constriction amplitude all increase with increases in BAC. The studies found that alcohol consumption can



cause impairment that results in PLR changes and that occasional or light drinkers started experiencing impairment and corresponding changes in PLR at lower BAC levels than chronic drinkers.

Drugs can cause physical and mental impairment that affect PLR. The level of impairment varies with the type of drug, amount consumed, and usage history (chronic drug users are less affected by drugs than non-chronic users). Drugs that have been evaluated to determine PLR changes with consumption include marijuana<sup>6, 7, 9, 10</sup>, opioids<sup>6, 11</sup>, MDMA<sup>12</sup>, and pentobarbital (barbiturate)<sup>6</sup>.

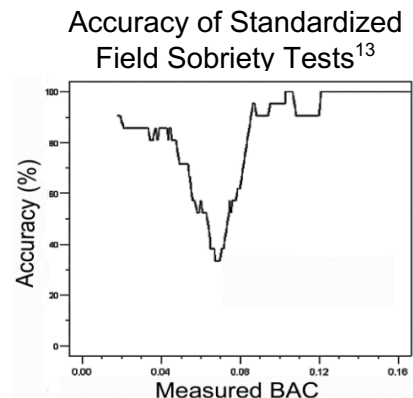
Taking drugs and alcohol together or combining drugs can cause increased changes in PLR. As discussed, marijuana is the most commonly used drug that can cause impairment and marijuana and alcohol are frequently taken at the same time. Combining marijuana and alcohol causes greater PLR changes than either marijuana or alcohol alone.

## PLR Compared to Other Drug and Alcohol Tests

Drug tests in the workplace can detect the presence of specific drugs in a person's blood stream. Depending on the drug and type of test, drugs can be detected from up to 12 hours to several days or even longer in some cases. A positive drug test indicates that the person has taken drugs at some point in the recent past but it does not identify risk of impairment at the time of the test.

The most common way to determine alcohol consumption is to measure blood alcohol content (BAC) with a breathalyzer. Measuring BAC will determine if someone is legally able to drive but it does not determine impairment. Light drinkers can be much more impaired at a particular BAC level than chronic drinkers. A BAC level that allows an individual to legally drive does not mean that the individual is unimpaired, safe to drive, or would be safe to work.

An evaluation of the Standardized Field Sobriety Tests<sup>13</sup> used by law enforcement found that people with BAC levels from 0.06% to 0.08% often exhibited physical and mental impairment that caused officers to believe they were over 0.08% BAC (DUI limit). The officer's prediction accuracy in this range was from about 30% to 60% depending on the actual BAC level. At BAC levels of 0.04% and below officers were about 80% or more accurate at predicting that a subject was below 0.08%. When BAC was greater than 0.09%, officers were 90% or more accurate (depending on BAC level) at predicting that BAC was above 0.08%.



In a study of people admitted to emergency rooms and perceived to be under the influence of alcohol<sup>14</sup>, physicians and nurses assessed patients prior to treatment to estimate alcohol intoxication and results were compared to BAC measurements. The medical assessment included a formal review of past alcohol history, a check for alcohol on the breath, and estimated impairment based on fine motor control, impaired gross motor control, slurred speech, change in speech volume, decreased alertness, sweating, slow or shallow respiration, sleepiness, pace of

speech and red eyes. They also took into account if there was a known history of chronic use, and whether there was a likely use of another substance (stimulant, depressant, intoxicant, marijuana, MDMA or prescription medication overdose). The study found that the measured BAC did not correlate well with the outward physical signs of intoxication. The greatest factor was the patient's normal alcohol consumption. Medical personal tended to overestimate the intoxication level (BAC) of non-chronic (less experienced) drinkers. In the case of chronic drinkers, medical personal tended to underestimate their intoxication level. The study found that chronic alcohol users with a high BAC were not as behaviorally impaired as those who were more "alcohol-naïve" with lower BAC levels.

A study of BAC and reaction time<sup>15</sup>, found slower reaction times with increased BAC levels. The study also evaluated reaction time of people who took alcohol and drugs at the same time. The largest change in reaction times occurred in people with BAC measurements between 0.01% and 0.049% BAC and at BAC levels over 0.10%.

If an individual has not consumed alcohol or drugs and is not fatigued, a PLR measurement will show a low impairment risk. Above 0.08% BAC the PLR system will generally show a high risk of impairment. Below 0.08% the system may or may not show an impairment risk. Since PLR changes are affected by nervous system impairment as opposed to blood alcohol level, they provide a more reliable way of determining an impairment risk than a BAC measurement.

## **SOBEREYE PLR Impairment Risk Measurement System**

Current systems that measure the level of alcohol consumption, the presence of drugs, or indicate fatigue each focus on a specific area. They do not measure impairment and they do not measure the effects of combining alcohol and drugs or combining fatigue with alcohol and/or drugs. Measuring PLR can evaluate impairment risk regardless of whether the impairment is due to a single source or multiple sources.

SOBEREYE's smartphone-based mobile system provides a quick PLR check to evaluate risk of impairment. PLR measurements are compared against each individual's baseline (normal, unimpaired) PLR and iris recognition verifies the user's identity so the system can be used remotely without supervision. A software dashboard controls testing schedules. Results are displayed on the smartphone and the software dashboard. The SOBEREYE system provides a quick way to evaluate impairment risk and improve workplace safety.



## References

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