



ALCOHOL & the FIRE SERVICE

a research monograph



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Chapter I

INTRODUCTION



"First you take a drink, then the drink takes a drink,
then the drink takes you."
~ F. Scott Fitzgerald, *The Great Gatsby*

INTRODUCTION: ALCOHOL IN THE FIRE SERVICE

Alcohol misuse has been a persistent concern in the U.S. fire service. More than a decade ago in a national survey by the International Association of Fire Chiefs,¹ a disturbingly large numbers of firefighters reported instances of on-duty intoxication, missed days of work due to alcohol use, and alcohol-related public misconduct among firefighters in their departments. Data collected since that survey suggest the epidemic of problem drinking has not improved.



In our research with fire departments across the nation, we found unusually high rates of heavy and binge drinking. And reports of negative incidents resulting from firefighter alcohol use are all too common in the media. For instance, a local news program in Louisiana recently reported, “Firefighter arrested for damaging firetruck while reportedly intoxicated.”²

If only this report was a rare occurrence. Unfortunately, even a cursory search of news outlets reveals a strikingly large number of reports highlighting the negative impact of alcohol on firefighters and departments. Each case like this is a human and a system tragedy. But imagine if we had training and standard operating procedures in place to effectively reach out to firefighters at risk, prevent accidents, and support our crew members to use alcohol in a safe and healthy manner.

Fire service media has published several articles by firefighters that urge readers to take the issue of alcohol seriously. A recent article in FireRescue1 entitled, “Why firefighter alcohol abuse puts us all at risk: It's time to have a courageous conversation about drug and alcohol abuse in the fire service,”³ laments that “even the first responders in the fire rescue shows on television all meet at the bar at the end of the shift to have a drink.”

Fire service leaders also have become increasingly sensitive to this issue. Firefighter Don Abbott, who leads the *Mayday Project*, has been collecting national data on maydays and found that an alarming proportion of called maydays occur for firefighters who have alcohol in their system, sometimes even on the second 24 hours of a 48-hour shift (personal communication).

Similarly, Liz Barton, who manages the First Responder Lifeline Program, noted, “A large percentage of our crisis calls from firefighters involve heavy drinking. Many don't realize it is a problem because it is part of the culture.”

National Fire Service organizations wisely anticipated the need to address alcohol use in the newly revised Fire Service Research Agenda, which categorizes research on firefighter alcohol abuse and misuse as one of its high-priority recommendations (Recommendation 18).⁴

We are sensitive to the fact that addressing alcohol use is a tough conversation to have with members of your crew and within national fire service organizations. In a recent issue of *Fire Engineering*, firefighter Mark Lamplugh frames the issue well:

Ask any seasoned firefighter whether firefighters drink more than average, and you're likely to get largely the same response. Usually some form of gentle deflection, or a sheepish acknowledgment, or perhaps a wry joke. They might even laugh in your face. What they're thinking — and what most experienced firefighters will recognize — is that firefighters are far more likely to engage in chronic excessive drinking.

The purpose of this monograph is to encourage and support those difficult conversations and to provide guidance on what fire departments can do to address alcohol use among its members. We hope to raise awareness of how alcohol use impacts the health and safety of firefighters, to provide a valuable and easily accessible source of information for firefighters, and to provide a rationale for excessive drinking prevention interventions that will be deployed and tested in the fire service.

Our goal is that every firefighter return home from his or her shift safe and healthy and come to work in the best psychological and physical shape. We also want to help firefighters develop practices that minimize the chances of developing alcohol problems post-retirement.

Several scientists and fire service leaders contributed to the chapters in this monograph or provided comments on early drafts. Author bios are provided in the appendix and reviewers are listed below. We plan for this to be a “living document” that can be modified and updated as new information and ideas develop over time. If you have suggestions, new information, or comments please forward them to training@theinnovationscorp.com.



Chapter II

ALCOHOL 101



"First you take a drink, then the drink takes
a drink, then the drink takes you."
— F. Scott Fitzgerald

HERE'S WHAT YOU NEED TO KNOW

- Alcohol consumption is measured by how many drinking occasions a person has and by how many drinks they consume during one occasion.
- Binge drinking is when a man takes five or more drinks — four or more for a woman — during a two-hour period.
- Both binge drinking and heavy consumption can have long-term adverse health effects.
- Individuals who metabolize alcohol at a slower rate based on gender or genetics, are more susceptible to alcohol-associated problems.
- There is no simple definition to what constitutes “normal” or “moderate” drinking.

HOW IS ALCOHOL CONSUMPTION MEASURED?

There are two key measurements when determining how much alcohol people drink: the frequency of drinking and the quantity of alcohol consumed during each drinking session. The frequency is the number of drinking occasions during a certain time interval.

Figure 1



However, there is no clear agreement among professionals on how to define what is a drinking occasion. It could be an evening of drinking at a bar, at a party, or at home, which could potentially include many hours of uninterrupted drinking. Or it could be consuming a drink during a one hour meal. Usually, this information is obtained in research or from patients in a clinic by simply asking “How frequently do you usually drink alcoholic beverages?”

The quantity of alcohol consumed in each occasion is measured by the number of drinks consumed. In the U.S., there is general agreement about what constitutes a drink, which has roughly 14 grams of absolute alcohol. This is defined as a five ounce glass of table wine usually at 12% alcohol concentration, a 1.5 ounce of distilled spirits at 40% alcohol concentration, a 12 ounce standard can of beer at about 5% alcohol concentration, and a 8-9 ounce glass of malt liquor at 7% alcohol concentration (see Figure 1).

However, despite these relatively precise definitions, research indicates that both drinks poured at home and at bars tend to be larger in volume than these standard definitions, especially in the case of spirits. Also, mixed drinks (cocktails) often have more alcohol because the serving includes more than one beverage, more than one type of distilled spirits, and is usually larger than 1.5 ounces.

When frequency and quantity are added together, it is possible to estimate the total volume of alcohol consumed by an individual over a certain period. As an example, a person who drinks four days a week and consumes two drinks on each occasion has a weekly alcohol volume equal to eight drinks. Alcohol researchers usually estimate the volume of alcohol consumed by assessing how much alcohol was drunk in the past 12 months or in the past 30 days.

However, the same volume of alcohol, say 14 drinks per week, can be drunk in a variety of ways, or patterns — some of which are more harmful than others. For instance, a pattern of drinking 14 drinks in a week by having two drinks every day will likely be less harmful than a pattern of consuming 14 drinks in, say, two occasions only.

The second pattern would likely lead to two occasions of drunkenness, which may lead to serious acute consequences such as an injury, a fight, or drinking and driving. However, drinking a relatively small number of drinks per occasion, two or three, can also lead to consequences if it is done for a considerable time. In this case, the harms associated with such drinking are chronic health problems such as gastritis, hypertension, cirrhosis of the liver, and others. The impact of alcohol on various organs of the body is described in more detail below.

Besides frequency and quantity, alcohol consumption is also assessed based on the frequency with which people get drunk. A common measure used to assess this type of heavier drinking is the frequency of binge drinking, which has been defined by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as a drinking occasion of about 2 hours during which a man consumes five or more standard drinks, and a woman consumes four or more standard drinks. This is the quantity and the time that would take a man or a woman of average height and weight in the U.S. to reach the legal blood alcohol concentration of about 0.08 g/dL.

Research evidence strongly indicates that binge drinking considerably increases the risk of acute problems such as car crashes, drunk driving, sexual assaults, and injuries. Over the long run, binge drinking also increases the risk of serious chronic health problems such as liver damage and other health related problems.

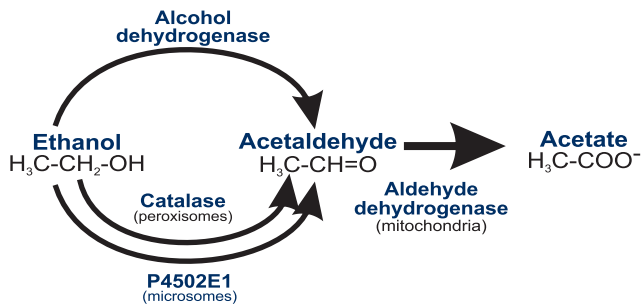


In 2018, the Substance Abuse and Mental Health Services Administration (SAMHSA) said that 26% of people ages 18 or older reported that they had had a binge drinking occasion in the past month; about 7% reported that they engaged in heavy alcohol use in the past month. SAMHSA defines heavy alcohol use as binge drinking on five or more days in the past month.



WHAT HAPPENS TO ALCOHOL IN THE BODY?

The way by which alcohol is broken down into different chemical substances in the body varies from person to person. This text box draws from an NIAAA publication describing alcohol metabolism.¹⁰



First, there are well-known variations in alcohol metabolism by gender. Men eliminate alcohol at a faster rate than women. Both genetic (enzymes) and environmental factors (how much drinking happens, health status) influence alcohol metabolism. These differences can make some people more susceptible for alcohol problems while others may be more protected from alcohol's harmful effects.

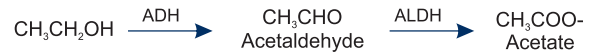
Most of the alcohol consumed is broken down with other chemical substances in the liver, with smaller amounts of alcohol being broken down in the brain, the pancreas, and the gastrointestinal tract. Alcohol dehydrogenase (ADH) and aldehyde dehydrogenase (ALDH) are the two enzymes responsible for this chemical process in the liver. First, ADH breaks down alcohol to acetaldehyde. Acetaldehyde is then broken down to acetate by aldehyde dehydrogenase, which is transformed into water and carbon dioxide for easy elimination.

Acetaldehyde, the first substance produced when alcohol is metabolized, is a highly toxic substance. Fortunately, it does not remain in the body for long, being almost immediately broken down as described above into acetate. Still, acetaldehyde has the potential of causing damage in the various organs that metabolize alcohol in the body.

Further, different people have different variations of the enzymes that break down alcohol, ADH, and ALDH. Those with efficient enzymes can eliminate acetaldehyde faster and are thus more protected from the toxic effects of acetaldehyde and from alcohol consumption. A slow ALDH enzyme can cause toxic acetaldehyde to build up in the body, creating dangerous and unpleasant effects that also may affect an individual's risk for various alcohol-related problems, including the development of alcoholism.

Research has showed that some ethnic groups in the population metabolize alcohol in different ways. For instance, those of Asian descent (e.g., Chinese, Japanese, and Korean) often have a higher prevalence of enzymes that are associated with a slower acetaldehyde elimination, which triggers unpleasant effects such as nausea, rapid heartbeat, and facial flushing when alcohol is consumed. This is known as the "flushing" response to alcohol.

The Chemical Breakdown of Alcohol



The chemical name for alcohol is ethanol ($\text{CH}_3\text{CH}_2\text{OH}$). The body processes and eliminates ethanol in separate steps. Chemicals called enzymes help to break apart the ethanol molecule into other compounds (or metabolites), which can be processed more easily by the body. Some of these intermediate metabolites can have harmful effects on the body.

Most of the ethanol in the body is broken down in the liver by an enzyme called alcohol dehydrogenase (ADH), which transforms ethanol into a toxic compound called acetaldehyde (CH_3CHO), a known carcinogen. However, acetaldehyde is generally short-lived; it is quickly broken down to a less toxic compound called acetate (CH_3COO^-) by another enzyme called aldehyde dehydrogenase (ALDH). Acetate then is broken down to carbon dioxide and water, mainly in tissues other than the liver.

Frequently, people want to know how “normal” or “moderate” drinking are defined. Unfortunately, there is no simple answer because the risk associated with drinking varies by gender, age, and health factors that are specific to each individual. The 2015-2020 Dietary Guidelines for Americans¹¹ defines drinking in moderation as up to one standard drink per day for women of legal drinking age and up to two standard drinks per day for men of legal drinking age.

There are people who should avoid alcohol completely, including those who plan to drive or operate machinery, or participate in activities that require skill, coordination, and alertness. Likewise, those who take certain over-the-counter or prescription medications (e.g., Benadryl, Clarinex, Sudafed), have certain medical conditions, are recovering from alcohol use disorder or are unable to control the amount that they drink, are younger than 21, and are pregnant or trying to become pregnant should abstain from alcohol.



WHAT ARE HANGOVERS?

Hangovers do not usually result from moderate drinking, but are a frequent consequence of excessive alcohol consumption. Typical symptoms include fatigue, weakness, thirst, headache, muscle aches, nausea, stomach pain, dizziness, sensitivity to light and sound, anxiety, irritability, sweating, and increased blood pressure. According to the

NIAAA¹² hangovers happen because of the several ways in which alcohol changes the way the body works.

Alcohol changes the way the brain communicates with the kidneys. The kidneys retain fluid, which increases urination and excessive loss of fluids, leading to dehydration and hangover symptoms like thirst, fatigue, and a headache. Alcohol can also make people fall asleep faster after drinking, but the sleep is restless and shorter. This contributes to fatigue. Alcohol also directly irritates the lining of the stomach and increases the amount of acid released, which can lead to nausea and stomach discomfort. Alcohol increases inflammation in the body. Inflammation contributes to the malaise that people feel when they are sick, so it may play a role in hangover symptoms as well.

Hangover symptoms can last 24 hours or more and can be both painful and dangerous. During a hangover, a person's attention, decision-making, and muscle coordination can all be impaired. This can impair ability to perform important tasks, such as driving, operating machinery, or caring for others. First responders, such as fire fighters and other emergency personnel, can therefore have their work performance considerably affected the day following an evening of drinking.

Also, there are no scientifically proven remedies for hangovers. Hangovers only end when the body finishes clearing the toxic products of alcohol metabolism. The body then rehydrates, healing irritated tissues, and restores immunities and brain activity to normal.

Drinking coffee, taking a shower, or having an alcoholic beverage the next morning do not cure a hangover. Taking over-the-counter pain relievers (acetaminophen) before going to bed does not help with hangovers, and the combination of alcohol and acetaminophen can be toxic to the liver. Like alcohol, certain over-the-counter pain relievers, including aspirin and ibuprofen, can increase acid release and irritate the lining of the stomach.

ALCOHOL USE DISORDER

As new knowledge develops about why and how people use alcoholic beverages and become dependent on them, new ways to diagnose and treat those who are affected by alcohol problems are also developed and adopted. In the U.S., the main source of information on how to identify those affected by alcoholic beverages is the American Psychiatric Association (APA). This professional organization updates the main source of information used by mental health professionals to identify and diagnose psychiatric problems: The Diagnostic and Statistical Manual of Mental Disorders (DSM).

The APA Manual presently in use is the 5th edition, updated in 2013, and is usually identified as the DSM-5. The DSM-5 identifies substance use disorders as: “A maladaptive pattern of substance use leading to clinically significant impairment or distress” as manifested by the presence of two or more of 11 different indicators, which must have occurred at any point in the same 12-month period. If only two or three indicators are present, the disorder is identified as mild. With four or five indicators present, the disorder is identified as moderate; with six or more indicators the disorder is severe. Approximately 5.8 percent or 14.4 million adults in the United States ages 18 and older had an alcohol use disorder in 2018 according to the DSM-5. This includes 9.2 million men and 5.3 million women. Adolescents can be diagnosed with substance use disorders as well, and in 2018, an estimated 401,000 adolescents ages 12 to 17 had an alcohol use disorder¹³.

Besides alcohol use disorder, excessive drinking can also lead to a series of interpersonal, social, health, and legal problems. In other words, drinkers can have alcohol-related problems without necessarily having a diagnosis of alcohol use disorder. As an example, research evidence shows that about two-thirds of individuals who report having driven a car after drinking too much in the past 12 months are not alcohol dependent¹⁴.

Some of the problems that have been associated with excessive drinking in the U.S. population are family separation and divorce, absenteeism from work, job loss, arrests for driving under the influence and drunkenness, injuries, fights, intimate partner violence, child abuse and neglect, and others. Altogether, excessive alcohol use and the problems associated with it cost the U.S. \$249 billion in 2010¹⁵.

DSM-5 Criteria For Alcohol Use Disorder (AUD)

The presence of at least 2 of these symptoms any time in the past 12 months indicates Alcohol Use Disorder

Mild: 2 or 3 symptoms; **Moderate:** 4 to 5 symptoms; **Severe:** 6+ symptoms (past 12 months)

- Had times when you ended up drinking more, or longer, than you intended?
- More than once wanted to cut down or stop drinking, or tried to, but couldn't?
- Spent a lot of time drinking? Or being sick or getting over other aftereffects?
- Wanted a drink so badly you couldn't think of anything else?
- Found that drinking—or being sick from drinking—often interfered with taking care of your home or family? Or caused job troubles? Or school problems?
- Continued to drink even though it was causing trouble with your family or friends?
- Given up or cut back on activities that were important or interesting to you, or gave you pleasure, in order to drink?
- More than once gotten into situations while or after drinking that increased your chances of getting hurt (such as driving, swimming, using machinery, walking in a dangerous area, or having unprotected sex)?
- Continued to drink even though it was making you feel depressed or anxious or adding to another health problem? Or after having had a memory blackout?
- Had to drink much more than you once did to get the effect you want? Or found that your usual number of drinks had much less effect than before?
- Found that when the effects of alcohol were wearing off, you had withdrawal symptoms, such as trouble sleeping, shakiness, restlessness, nausea, sweating, a racing heart, or a seizure? Or sensed things that were not there?

Chapter III

A BRIEF HISTORY OF ALCOHOL



“A man that drinks is throwing his life away.
Don't do it, hold on to your life.
There is nothing else to hold on to.”
~Tennessee Williams

7000 B.C.

Though fermented drinks were used by early Egyptians, some of the earliest alcoholic drinks were thought to have originated in China.

6000 B.C.

The cultivation of grapevines and a thriving wine industry developed in Mesopotamia-present-day Iraq.



800 B.C.

Barley and rice beer being produced in India

300 B.C.

Various cultures use wine for rituals and ceremonials



65 A.D.

Drunkenness begins to be criticized. The use of alcohol in moderation and medicinally was not prohibited.

600 A.D.

Muslims, Buddhists and Hindus abstain completely from alcohol.



1100 A.D.

Distilling was developed by a medical school in Italy.



MIDDLE AGES

Europe has begun trade in beer, wine, and mead

1600 A.D.

Beer manufacturing in Germany began distribution to England and Scotland. Mass gin production in England.



1789 A.D.

The first temperance society formed in Conn.

19TH CENTURY

By 1860, legal distilleries were producing 88 million gal. of liquor annually



1864 A.D.

first asylum treating alcoholism opened in Binghamton, NY

EARLY 1900's

18th Amendment outlawed alcohol in 1920... which caused a boom in bootlegging until 1933, when Prohibition was repealed.



MID 20TH CENTURY

Alcoholics Anonymous was founded in 1935. The AMA declares alcoholism a disease. By 1944, alcoholism was the 4th largest health concern in the US.



MODERN DAY

Today, an estimated 15 million Americans suffer from alcoholism. 40% of all car accident fatalities in the US involve alcohol.

HERE'S WHAT YOU NEED TO KNOW

- Alcohol has been part of human society before the invention of writing.
- In the U.S., excessive drinking wasn't seen as problematic until the 1800s.
- Despite Prohibition's repeal, viewing alcoholism as a disease persisted.
- Medication and scientific methods are now used to treat alcohol addiction.



Alcoholic beverages have been consumed by humans for at least 9,000 years. Early civilizations produced and drank alcoholic beverages in different ways, frequently on special occasions. Throughout history, alcohol has been used both in moderation and excessively, leading to intoxication.

Early, alcohol was commonly produced through fermentation of fruits, most frequently grapes, but also other fruits, honey, grains, and sugar cane. In modern-day Georgia and Iran, wine making dates back 7,400 years. Simple-ingredient beers were known staples of society at least 4,000 years ago. Distillation has also been practiced for many centuries, from the 3rd century in Egypt and maybe the 1st or 2nd century in China.

When used to produce alcoholic beverages, distillation increases the alcohol content of beverages beyond that which would be achieved just by fermentation. While most table wines have an alcohol content around 10% to 12%, in most distilled commercial beverages the content is around 40%.

In the U.S. before colonization, fermented beverages were produced by a few American Indian tribes mostly in the American Southwest, and alcohol's effects were not well known to American tribes.^{1,2,3} Only after contact with white settlers did alcohol use become more common among American Indians. Settlers offered it to Native Americans as a gesture of friendship and soon became a trade commodity.

Because alcohol use was not common, American Indians did not have a clear set of rules on how to drink and control potential problems associated with excessive drinking. The pattern of alcohol use they adopted, drinking to intoxication, was a learned behavior from white settlers in the American western frontier.^{2,4} However, then, as now, there was considerable variation in the way different American Indian tribes responded to alcohol.

Nowadays not all tribes use alcohol excessively, and some have considerable levels of abstinence.^{5,7} This indicates that contrary to some ideas, American Indians and Alaskan natives are not genetically predisposed to excessive drinking or alcoholism.²

THE RISE OF TEMPERANCE

Between the late 18th and early 19th centuries, ideas and societal reaction about drinking in the U.S. were shaped by the Temperance Movement. According to Levine, there was no or little concern about the excessive use of alcohol during 17th and 18th centuries in the U.S.⁸ Drunkenness was common and was not associated with poor behavior or disease burden.

Little by little, however, this view changed, and the clergy and politicians at the time began to express concern about drunkenness and the effects of excessive use of alcohol on drinkers. Those who got drunk frequently were subjected to criticism but were not seen as sick. Common drunkenness was not seen as a disease that needed treatment.

Still, according to Levine, beginning in the 19th century words such as “irresistible” or “overpowering desire” began to be used to describe how those who got drunk frequently felt about alcohol and drinking.

Those most concerned with the effects of excessive use of alcohol among colonials were the Puritan clergy, with some referring to frequent drunkenness as a “kind of madness.” At that time, the idea that excessive use of alcohol and frequent drunkenness as a disease was most clearly expressed by physician Benjamin Rush in the early 1800s. Rush identified alcohol as the cause of a disease, stated that those addicted had lost their control over drinking, clearly described this state as a disease, and indicated that the cure could only be achieved by abstinence from alcohol.

Rush's ideas were supported and adopted by the Temperance Movement, which spread through the U.S. during the 1800s. Several prominent physicians, ministers and politicians more and more referred to excessive drinking as a disease, lecturing and writing about it, and disseminating their ideas among the population.

By the end of that century, with more people accepting the idea that excessive drinking was a disease, temperance ideas began to focus not so much on controlling alcohol use but on prohibiting the manufacture and sales of alcohol. By this time, the concern was not only with addiction, but also about the effects of drinking on industrial accidents, train crashes, and other societal problems.

RISE AND FALL OF PROHIBITION

Influenced by temperance ideas, states began to pass legislation to control and sometimes ban the production of alcoholic beverages. On January 29, 1919, congress approved the 18th Amendment to the U.S. Constitution, which prohibited the manufacturing, transportation, and sale of alcohol within the United States. Prohibition lasted 14 years, and was repealed by the 21st Amendment, which took effect December 5, 1933.

Despite Prohibition, alcoholic beverages did not disappear from American's lives. Prohibition enforcement was weak in urban areas, bootlegging was common, and organized crime such as the Mafia took control of illegal manufacturing and distribution of alcohol. Alcohol remained relatively available to those who wanted to drink, but consumption decreased and a few problems such as alcoholic liver cirrhosis also declined in the U.S. population.⁹



Chapter IV

ALCOHOL'S PLACE IN FIRE SERVICE CULTURE AND LORE



“No wine, no wisdom. Too much wine —
the same.” ~ Blaise Pascal

HERE'S WHAT YOU NEED TO KNOW

- Moderate drinking - 2 or fewer drinks for men and 1 for women - is associated with lower risk for cardiovascular disease in some studies.
- There are better and safer ways to reduce risk for cardiovascular disease than drinking, like maintaining a healthy body weight and regular exercise.
- Heavy and binge drinking substantially increases your risk of cardiovascular disease and death.

ALCOHOL IN THE FIRE SERVICE: A CAUTIONARY TALE



Reflect on the words of firefighter Jamie Fulk¹ and pay close attention to your initial reaction:

“For my entire career the word firefighter and alcohol have been synonymous. It's like saying butter and bread, they just go together. Drinking alcohol after hours is something that many firefighters brag about and even plan their lives around.

Drinking alcohol in excess is sadly a culture that is ingrained into the fire/EMS business, and seemingly expected in every happy or sad event. Not all firefighters drink alcohol or take opioids, but the truth is, many do and struggle with keeping it all in check.”

Consistent with Firefighter Fulk's message, cringe-worthy headlines frequently appear in the media, such as: “Firefighter disciplined after reportedly 'reeking of alcohol' while on duty.”² It would be easy to dismiss this as a one-off occurrence. Unfortunately, it is not.

Retired Firefighter Don Abbott has been collecting national data on maydays, and found that an alarming proportion of called maydays occur for firefighters who have alcohol in their system, sometimes even on the second 24 hours of a 48 shift-hour (personal communication). Similarly, Liz Barton, who manages the First Responder Lifeline Program, said, “A large percentage of our crisis calls from firefighters involves heavy drinking. Many don't realize it is a problem because it is part of the culture.”

It is a natural defense mechanism to make light of or rationalize heavy alcohol use. It frequently occurs in other occupations where heavy alcohol use is common. However, given the large number of media reports and scientific studies in the fire service that highlight a heavy drinking culture, it is important for us to step back and reflect on whether alcohol should become one of our primary behavioral health concerns.

ALCOHOL USE BY FIREFIGHTERS: WHAT FIREFIGHTERS THINK

Fortunately, the fire service has several large-scale studies to draw on to address the question of whether heavy use is a problem. First, let us look at what firefighters say about alcohol use. Dr. Sara Jahnke and her team³ at the Center for Fire, Rescue & EMS Health Research interviewed 423 career and volunteer firefighters from around the nation on their beliefs about alcohol use in the fire service.

While some firefighters thought that drinking among their peers was not any different from that found in their professional communities, many others believed that alcohol played an important role in the fire service and that heavy drinking was common. Here are two representative quotes from the firefighters:

“I would say heavy. Really. I mean, every social event pretty much that we have is based around the bar area and what not.” ~ Fire Chief

“You’re not going to go to any fire department – fire department function, I mean, outside of work that doesn’t have alcohol. There will always be alcohol and there will always be heavy coolers of alcohol.... There will never be a lack of alcohol at any function — even ones that are department sponsored.” ~ Firefighter

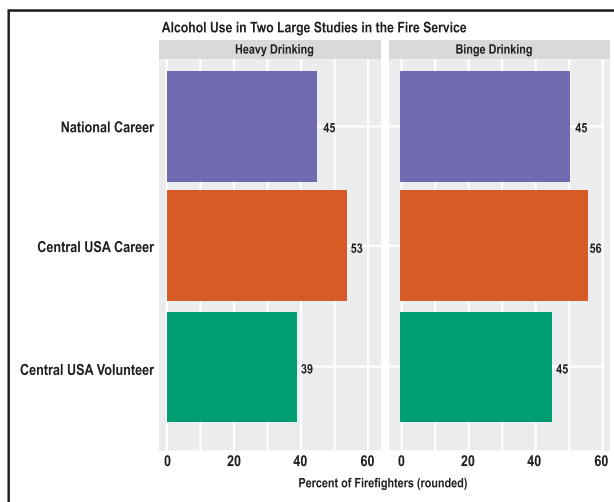
ALCOHOL USE BY FIREFIGHTERS: WHAT THE RESEARCH SAYS

What do you think? Medical experts often define more than two drinks for men and more than one for women as heavy drinking. Is heavy drinking common among the firefighters in your department? Also, binge drinking is defined as the consumption of five standard drinks for a man and four standard drinks for a woman in about 2 hours. The sizes of standard drinks are: a 12-ounce can of beer, a 1.5-ounce shot of liquor, and a 5-ounce glass of wine. Binge drinking is particularly risky to health and safety.

Although alcohol use will vary by person and department, there have been several large studies that have provided a consistent picture of how prevalent heavy and binge drinking is in the fire service. Two large-scale studies funded by FEMA's Research and Development program assessed the alcohol use of a large number of firefighters. The first was conducted in the central United States in 11 career and 13 volunteer fire departments, that involved 459 and 197 firefighters, respectively. The second was a national study of 20 career departments covering 954 firefighters. The firefighters were asked to report how much they typically drank on an off day and whether they had binge drunk during the past 30 days. The numbers were scary.

As you can see in the figure above, nearly half of all career firefighters reported heavy drinking on their off days and a similar percentage reported binge drinking during the past month. Volunteer firefighters reported only slightly lower rates. When the researchers asked those who reported binge drinking how many times in the past month they had done so, the average number was 4.9 for career firefighters in the national study, and 4.4 and 6.7, respectively, for career and volunteer firefighters in the study conducted in the central U.S. So, not only do a large percentage of firefighters binge drink, but they also do it frequently.

Smaller studies focused on single departments found similar rates of heavy drinking. Even more troubling is the finding from the study conducted in the central U.S., which showed that 9% of career and 10% of volunteer firefighters admitted to driving after having too much to drink in the previous year.



According to the National Institute of Alcohol Abuse and Alcoholism (NIAAA) at the National Institutes of Health, 26.5% of adults in the U.S. report binge drinking and 6.6% report heavy drinking in the past month.⁴ You might think that those statistics include a lot of people who are older or have conditions where they can't drink so they are biased. Well, that is true.

But if you look at the military, whose personnel are more comparable to the fire service, binge drinking rates are approximately 9% — dramatically lower than firefighters.⁵ So, no matter how you cut it, firefighters drink at a higher rate compared to other groups.

WHY FIREFIGHTERS USE ALCOHOL

The Centers for Disease Control and Prevention, describes which adults are most likely to engage in heavy drinking:⁶

“Adults who regularly felt worried, nervous, or anxious, or who regularly felt depressed, were more likely than adults without these feelings to engage in heavy drinking in the past year.”



Given the behavioral health issues faced by firefighters, anxiety and depression are likely reasons for the high rates of heavy and binge drinking. In addition to emotional challenges, there also are several unique occupational factors that are related to heavy drinking among firefighters. Here are three of those factors.

1. Occupational Stress

Because of the nature of their work, firefighters often struggle with unique, job-related stressors such as exposure to traumatic events, anxiety, and post-traumatic stress.⁷ Research has shown that firefighters consume alcohol to cope with their negative emotions and the traumas they witness.⁸⁻¹¹ Firefighters say they use alcohol to “unwind” after a difficult time on the job. For example, drinking was the second leading coping strategy reported (at 19%) by firefighters who responded to the 1995 Alfred Murrah Federal building bombing in Oklahoma City.⁹

2. Prolonged Work Schedules and Unhealthy Sleep Patterns

Having a work schedule that results in a lack of a consistent workdays likely contributes to increased alcohol use among firefighters. For example, firefighters often report attending social gatherings centered on alcohol use on their off days with colleagues, using work schedule as the excuse for drinking alcohol since they do not have to go to work next morning, or using alcohol to help them sleep on their days off.

One study found that career firefighters believe that their 24-hour shift schedule might contribute to their heavy alcohol use.³ As you will read in the coming chapter about alcohol and sleep, heavy drinking and poor sleep go together. For firefighters, there may be an unfortunate synergy between poor decisions about consuming alcohol because of fatigue and the negative impact of alcohol on sleep quality.

3. An Occupational Culture Promoting Drinking

Alcohol consumption is considered an important part of the fire service culture. The acceptability of alcohol use in the fire service is at least partially due to the historical role alcohol has played in firefighters' social settings and activities.³ As an example, both career and volunteer fire stations are frequently used as a social gathering place for their members and communities for events like promotion or retirement parties and fund-raising events. Some fire departments have bars in their station or have social clubs which contribute to a culture of drinking. This acceptance may contribute to firefighters' alcohol abuse. Research also shows that alcohol use behavior among individuals and those in their social networks is highly correlated.¹² This raises concern for the career fire service, whose members are living in the fire station and working closely for extended periods of time. Besides, the concept of “brotherhood” as social bonding and connection is deeply rooted among firefighters. Getting together for drinks off duty is an important way of socializing and bonding with others — career and volunteer — after long hours at work³.

All is not Lost

Firefighters are more likely to drink heavily than the general public or even other occupations thought to have a culture of alcohol misuse. Many things about working as a firefighter make it easier to move from healthy to heavy drinking. We are only about a generation removed from a time when some fire departments kept well-stocked bars, and anecdotal tales of heavy drinking before and after fire calls abound. In fact, over the past 10 years, local media outlets have reported several holdout volunteer departments finally enacting regulations prohibiting alcohol on fire department property.

It is important for firefighters to carefully consider how much and when they drink alcohol and to take steps to ensure alcohol isn't a risk for negative safety and health outcomes. In the coming chapters, you'll read that there are concrete, proven ways to help firefighters rein in their alcohol consumption.



Chapter V

ALCOHOL AND CARDIOVASCULAR DISEASE



“Alcohol in excess is really bad for the heart. It can cause high blood pressure and promote arrhythmias. It can cause cardiomyopathy where the alcohol is actually toxic to the heart muscle cells, and that can lead to heart failure.”

~ Dr. Robert Kloner,
Professor of Medicine at the University of Southern California.

HERE'S WHAT YOU NEED TO KNOW

- The association between alcohol consumption and the cardiovascular system is controversial. The controversy hinges on whether there are beneficial effects of moderate alcohol consumption on the heart and, more in general, on cardiovascular-related mortality.
- The protective effect of beer, wine, and liquor consumption on cardiovascular diseases has been reported among moderate (2 or fewer drinks per day for men and 1 or fewer for women) drinkers.
- Binge drinking considerably increases the risk of all cardiovascular problems.
- People may be unaware of many negative effects of alcohol on the cardiovascular system, and medical personnel may not identify these effects without accurate reporting by the patient.



Heavy and binge drinking have enormous negative consequences for the health of our nation, accounting for 18.5% of emergency department visits and approximately 95,000 deaths (NIAAA, 2021). In fact, **alcohol is the third leading preventable cause of death in the US**. The first being tobacco use, and the second poor diet and physical inactivity. In aggregate, the negative impacts of alcohol cost the US economy \$249 billion in 2010 alone. One of the ways alcohol impacts our health and the economy is through its role in promoting cardiovascular disease.

You may have heard that alcohol use is good for the heart. However, the association between alcohol consumption and the cardiovascular system is perhaps one of the most controversial issues among researchers and clinicians working in the alcohol field. At the center of the controversy is a debate regarding moderate alcohol consumption's potential heart benefits and its effect on mortality. Remember, moderate drinking is typically defined as two or fewer drinks per day for men and one for women.

Some public health professionals, backed by existing research, argue that evidence for the positive effects of alcohol on the heart are not valid. They say advising people to drink moderately to prevent cardiovascular diseases is dangerous given the high number of acute and chronic social, health, familial, and legal problems associated with heavy and binge drinking.

Other public health professionals say the evidence may not be valid because many studies that show benefits of alcohol consumption on the heart did not study the correct group of individuals. These studies include ex-drinkers with health problems among the abstainers, the so-called “sick quitters,” which inflates levels of disease among those who do not drink. This makes moderate drinkers look healthier by comparison.

Public health professionals and many clinicians also argue there are many ways to protect against heart disease that are safer than drinking alcohol. Regular exercise, a healthy diet, regularly sleeping eight hours a day, and a balanced work/family/leisure life are all safer than drinking and protect not only against heart disease but also against many other health problems. Many moderate drinkers have these healthy habits, and this, rather than moderate drinking, could be the real source of protective effects.

However, some researchers are convinced that moderate drinking does indeed provide a protective effect against coronary heart disease (CHD) above and beyond other factors (Roerecke and Rehm, 2014).

Some public health professionals also argue that studies showing beneficial effects of alcohol on the heart fail to account for other factors that could explain these good effects. For instance, many of those who have a moderate pattern of drinking, — one or two drinks per day — also have other healthy habits that could explain their better health. These individuals avoid drinking excessively, and typically have a better diet, exercise regularly, have better health care, frequently are better educated, and have a higher socioeconomic status. Research shows that all of these factors are associated with better health. However, they also point out existing evidence that moderate drinking affects certain types of hemostatic factors such as atherosclerosis and inflammation, both of which are present in most cardiovascular diseases (Piano, 2017).

This chapter will briefly review research on the effects of alcohol on the cardiovascular system, including alcohol's association with hypertension, coronary heart disease, stroke, peripheral arterial disease, and cardiomyopathy. For a more in-depth review, please see the article by Piano (2017) listed in the reference section at the end of the monograph.

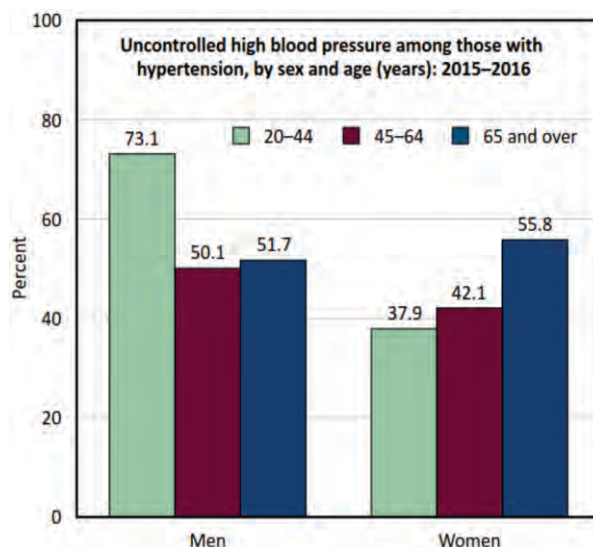
Piano asserts that alcohol's effects on the cardiovascular system are strongly associated with the total number of drinks consumed, the frequency with which drinking occurs, and the number of drinks consumed per occasion. Moderate drinking, defined by the National Institute on Alcohol Abuse (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015) as one standard drink per day for women and up to two standard drinks per day for men of legal drinking age is the drinking pattern thought by some scientists to be associated with beneficial effects on the cardiovascular system.

Obviously, saving the drinks one can have during the week and consuming five or six in a single day when one is off work is not moderate drinking. In fact, as defined in Chapter Two, Alcohol 101, four to five drinks in two hours for women or men is defined as binge drinking and has serious negative effects on the heart and other bodily systems.



HYPERTENSION

Hypertension is relatively common among adults in the U.S. population. In 2015-2016, 30.2% of adults 20 and older had hypertension, measured as systolic blood pressure equal or higher than 140 mmHg and diastolic blood pressure equal or higher than 90 mmHg (National Center for Health Statistics, 2019). The rate was slightly higher among men, 31.3%, than among women, 28.7%. In addition, as the bar graph shows, the percentage of those with uncontrolled high blood pressure among those who have hypertension is relatively high. This is especially true among men 20 to 44 years old.



The association between alcohol and hypertension has been known for more than a century. It first came to light in a 1915 study by C. Lian of soldiers drinking in the French army. (Kodavali and Townsend, 2006). But the observation was ignored until about 45 years ago. Since then, studies have shown hypertension occurs at relatively low levels of drinking — about three or more drinks per day (Kawano, 2010; Klatsky and Gunderson, 2010). At lower levels of drinking, a “J” shaped relationship has been reported, indicating that lower blood pressure is associated with up to two drinks per day, although this has been found among women only (Room and Rossow, 2001; Rehm et al., 2010).

Binge drinking, however, brings higher hypertension risk. Drinking more than five standard drinks in a single sitting has been associated with transient increases in blood pressure that range from 4 to 7 mmHg for systolic and 4 to 6 mmHg for diastolic blood pressure (Plano, 2017). In a Canadian study, weekly or monthly binge drinking at age 20 was positively associated with elevated systolic blood pressure and higher risk of hypertension compared to non-binge drinkers (Puddey et al., 2019).

Among the American population, hypertension for between 5-30% of patients is thought to be due to their alcohol consumption. There also are many known mechanisms by which alcohol increases blood pressure. These include alcohol's effects on the sympathetic and central nervous system, hormones like cortisol, insulin resistance, and through genetic disposition (Kodavali and Townsend, 2006).

This association between blood pressure and alcohol has been found in more than 100 studies in several countries. In the U.S., it has been demonstrated among both men and women of all ethnic groups. The association is also independent of other variables such as age, weight, diet, coffee consumption, education level, tobacco use, and the alcoholic beverage type. Heavy drinking may be the most common reversible cause of hypertension (Tomson and Lip, 2006; Klatsky and Gunderson, 2010).

The common but mistaken belief that hypertension only impacts older people is problematic, especially with a group like firefighters who are comprised of younger individuals. Because of its association with drinking, diet, and genetic makeup, hypertension can be clinically present in adults in their 20s and 30s. Anyone who exceed moderate drinking guidelines can develop hypertension and put themselves at risk for other cardiovascular problems. It is clear, therefore, that drinking which leads to hypertension is an important link explaining how alcohol impacts cardiovascular disease (Puddey et al., 2019).

It is also important to know that reducing alcohol consumption can lower blood pressure. In a large study that summarized results from a variety of medication trials, the reduction in blood pressure with reduction in alcohol consumption was on average about 3.3 mmHg in systolic blood pressure and 2.4 mmHg in diastolic blood pressure (Xin et al., 2001). Thus, if you struggle with hypertension, reducing your alcohol intake may help you control your blood pressure.

When discussing blood pressure with a health professional, it is important that you inform them about your alcohol intake. Precise information about alcohol use will lead to accurate assessments and treatment, which could lead to a reduction in drinking before damage to health becomes serious. Unfortunately, the rate of screening and intervention for alcohol consumption and heavier drinking in clinical settings is still low. Thus, it will often be up to you to raise the issue of whether your alcohol use is impacting your blood pressure (Rehm et al., 2016).

CORONARY HEART DISEASE (ISCHEMIC HEART DISEASE)

The most common type of heart disease is coronary heart disease (CHD), also known as ischemic heart disease. In 2017, 365,914 people died from CHD in the U.S., and the overall death rate for ischemic heart disease was 92.9 per 100,000. The rate for men (129.6 per 100,000) was almost two times higher (1.92) than the rate for women (66 per 100,000). Gender, age, smoking, hypertension, diabetes, high levels of low-density lipoproteins (LDL), family history, and genetics are also factors of risk for CHD (Klatsky, 2015). Important for firefighters, CHD is the leading cause of on-duty death in the fire service and a major cause of poor health (Soteriades, et al, 2011). Adding the high rates of heavy and binge drinking to the picture compounds the CHD risk in firefighters.

CHD symptoms frequently occur during exercise, other strenuous activities (such as fighting fire), and sometimes strong excitement and emotions. The main signal of a problem is recurring discomfort or constricting chest pain (angina). There can also be clammy skin, nausea with or without vomiting, neck pain, shortness of breath, and pain in the arm and shoulder. Major complications of CHD include myocardial infraction and death from cardiac arrest.

As mentioned, many studies show a protective effect of moderate drinking (one for women and up to two drinks per day for men) on CHD (Corrao et al., 2000; Movva and Figueredo, 2013; Zhao et al., 2017). This association between drinking and CHD is described as J-shaped (Klatsky, 2015). This curve indicates that moderate drinkers have lower mortality from CHD than heavier drinkers and abstainers.

Some argue that the higher mortality rate among abstainers could be a result of the “sick quitters” - those who quit drinking because of other health problems that would increase their chances of dying from CHD. Roerecke and Rehm (2010) examined this idea, showing that indeed former drinkers were at higher risk for CHD mortality than lifetime abstainers, but not for CHD morbidity (disease).

Further, the pattern of drinking is also important. When the pattern includes episodic heavy drinking (greater than 2 drinks for men, 1 for women), the protective effect of alcohol disappears (Roerecke and Rehm, 2010; Roerecke et al., 2011). For instance, the risk of CHD is 1.5 times higher among episodic heavy drinkers compared to moderate drinkers (Roerecke and Rehm, 2010). In a summary of seven other studies, the risk of CHD for heavy episodic drinkers was almost twice as high as that for moderate drinkers without similar episodes (Roerecke and Rehm, 2014).

The association between alcohol and CHD is complex, and it can be influenced by age, heart health status, and other factors. For instance, a review of results from 45 studies did not find a protective effect for alcohol on CHD when study participants were younger than 55 (Zhao et al., 2017). Gender also appears to modify alcohol's effects on CHD. Women seem to have stronger benefits than men from moderate drinking but also experience a quicker negative effect when drinking is lower (Roerecke and Rehm, 2014).

The idea that different types of alcoholic beverages may provide different levels of protection against CHD has also received attention in scientific literature.

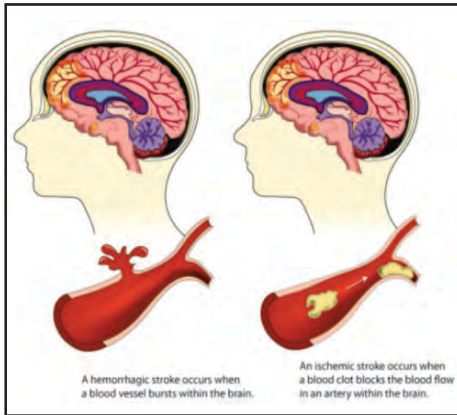
The “French Paradox,” for instance, refers to the observation that in France the association between a diet rich in fat and higher mortality in the population is lower than in other countries. This was attributed to a protective effect of drinking red wine by the French population. Red wine has several chemical compounds with known beneficial heart effects. The antioxidants in red wine which may reduce a risk of heart disease can also be found in grapes, red grape juice, or blueberries. More recent data, however, indicates this protective effect is associated with all types of wines and beer (Klatsky et al., 2003; Klatsky, 2015), and indeed all types of alcoholic beverages including spirits (Lucas et al., 2005; Song et al., 2018).



Finally, studies have also examined possible ways alcohol protects from CHD. The evidence suggests there are different ways in which this happens (Klatsky, 2015). For instance, alcohol may raise levels of good cholesterol (HDL) in the blood, lower the risk of diabetes, decrease stress, or help good effects of antioxidants.

After years of controversy, the most recent evidence seems to support the existence of alcohol's protective benefits against CHD morbidity and mortality, but only when consumed at moderate levels. While the effects are not dependent upon the type of alcohol one drinks, they are completely eliminated once episodic heavy drinking is introduced. There are several other impactful factors such as gender, age, family history of heart disease, genetic makeup, and the presence of other health problems. The mechanisms by which alcohol confers protection are complex and include alcoholic stimuli on blood clotting, cholesterol levels, and other factors.

STROKE



Every year in the United States, more than 795,000 people suffer from a stroke. That is the equivalent of one stroke every 40 seconds, resulting in one fatality every 4 minutes (CDC, 2020). Stroke is a leading cause of serious long-term disability and reduces mobility in more than half of stroke survivors aged 65 and over. In addition to the impacts on human life, the financial cost in the United States reaches an estimated \$34 billion each year. These expenses include health care services, medicines to treat stroke, and missed days of work.

There are several important controllable stroke risk factors. These include smoking, diabetes, diet, lack of exercise, obesity, and alcohol and drug abuse. Other risk factors, such as high blood pressure, high cholesterol, carotid artery disease, peripheral artery disease, atrial fibrillation, and other heart diseases can be treated and brought under control. Risk factors that cannot be controlled are age, family history, race, gender, and a prior stroke.

As with other heart problems, drinking in moderation is the key. Firefighters who drink should do so within the definition of moderation (2 drinks per day or fewer for men, 1 for women). Beyond this, alcohol use becomes a risk factor for stroke as described below.

Drinking too much alcohol raises the levels of triglycerides (fats) in the blood. This, combined with high LDL (bad cholesterol) or low HDL (good cholesterol), has been associated with fatty buildup in the artery walls which in turn increases the risks of heart attack and stroke. Binge drinking also increases risk of atrial fibrillation, an irregular or quivering heartbeat that can lead to blood clots, stroke, and heart failure.

A study in Japan showed that consuming about five or more drinks per day increased the risk of total stroke by 68%. In our studies, more than half the firefighters reported binge drinking on their off days. Evidence from research shows that alcohol is a risk factor for several conditions such as atrial fibrillation and cardiomyopathy, which would also lead to an increased risk of stroke (O'Keefe et al., 2014; Klatsky, 2015). The association between alcohol and stroke is not simple. Depending on the type of stroke, and the amount and pattern in which alcohol is consumed, alcohol can be both a risk and a protective factor (Rehm, et al., 2010).

Other studies have associated moderate drinking with health benefits and lower risk of stroke mostly among those older than 50. For example, moderate drinking has been associated with reductions in risk of stroke between 16% and 17% (Christensen et al., 2018). A review of 35 studies showed that consumption of less than 12 g of alcohol per day reduced risk of total stroke by 17% and ischemic stroke by 20% (Reynolds et al., 2003). In a third review, the authors concluded that drinking 20 g to 30 g of alcohol a day (about two standard drinks) reduced stroke in middle-aged individuals by up to 20% (Emberson and Bennett, 2006). Some of these studies have indicated there are health benefits from wine, especially red wine.

On the other hand, alcohol is a risk factor for both subarachnoid and intracerebral hemorrhagic stroke (Klatsky, 2015; Klatsky and Tran, 2016). This was confirmed in a review of 27 studies with results for both ischemic and hemorrhagic strokes (intracerebral and subarachnoid). Consumption of two to four and more than four drinks per day was associated with an 8% and 14% increase in risk of ischemic stroke, respectively (Larsson et al., 2016).

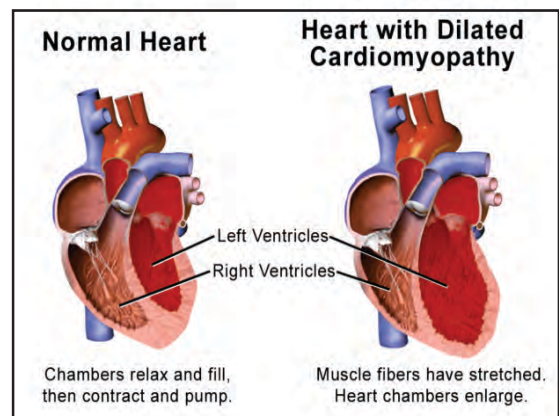
Consumption of more than two to four drinks per day was not associated with hemorrhagic stroke. But consumption of more than four drink per day increased risk of intracerebral hemorrhage by 67% and subarachnoid hemorrhage by 82% (Larsson et al., 2016).

It may also be difficult for drinkers to remain steady drinkers of one to two drinks per day without increasing their consumption and exposing themselves to risk (O'Keefe et al., 2014; Manolis et al., 2019). Even drinking within these guidelines may not guarantee that drinkers will be completely protected from drinking's consequences. A recent study showed that drinkers who drank within weekly guidelines experienced more deaths and increased hospital stays compared to abstainers (Sherk et al., 2020).

Alcohol's association with stroke, as was the case with CHD, is dependent on the amount and pattern of drinking. Binge drinking is always a risk factor. Most medical professionals agree that no one should start drinking to lower their risk of CHD. Alcohol is a powerful and addictive drug, and there are safer and more effective ways like exercise and diet to protect against strokes and heart diseases.

ALCOHOLIC CARDIOMYOPATHY

Cardiomyopathy is a disease of the heart muscle in which the muscle changes with consequences to the normal functioning of the heart. There are several types of cardiomyopathy and they can occur for different reasons. The most common, occurring in about 30% of all cases, is dilated cardiomyopathy, also called alcohol cardiomyopathy because it results from the direct toxic effect of chronic excessive alcohol consumption on the heart muscle (Mirijello et al., 2017; Rehm et al., 2017).



Alcohol cardiomyopathy occurs mostly in adults with more than 10 years of excessive drinking. In fact, this long-term history of excessive drinking is a central factor in the diagnosis of cardiomyopathy (Piano, 2017). The prevalence is about the same among men and women because although women are more susceptible to alcohol's effects, men drink more than women (Mirijello et al., 2017).

As we reported in Chapter 4, alcohol consumption and heavy drinking have been a longstanding part of the fire service culture.

Excessive drinkers who regularly consume about seven to eight drinks per day (over 90 g of alcohol per day) over five years or more are at risk to develop asymptomatic cardiomyopathy and later to develop full disease (Rehm et al., 2017; Fernández-Solà, 2020). Among patients being treated for alcohol use disorder, about 20% to 40% can have cardiomyopathy (Piano and Phillips, 2014; Mirijello et al., 2017). In the U.S., women are more affected than men, and Blacks are more affected than Whites. Genetic factors, use of other drugs besides alcohol, and presence of other heart diseases can also play a role in the development and course of cardiomyopathy (Fernández-Sol, 2020).

The disease frequently begins in the left ventricle, later spreading to the right. Symptoms do not appear immediately, but only after changes to the ventricle are serious enough to trigger other symptoms like those of other types of heart problems. They include shortness of breath and fatigue and swelling of the feet, legs, abdomen, and veins in the neck. Irregular heartbeat, heart valve disease, and ultimately congestive heart failure can also appear. Damage to other organs such as the liver, nervous system, pancreas, and digestive tracts can occur (Fernández-Sol, 2020). Abstinence and reduction in drinking lower the risk of cardiomyopathy and are important steps in treatment (Rehm et al., 2017).

ARRHYTHMIAS

Alcohol consumption, especially binge drinking, is associated with supraventricular arrhythmias, especially AFib (Klatsky, 2015; Gallagher et al., 2017). One study compared incidents of AFib in drinkers who consumed six or more drinks per day with drinkers who consumed less than three drinks per day. It showed that the heavier drinkers were two times more likely than the lighter drinkers to have atrial flutter, supra-ventricular tachycardia and premature atrial contractions (Klatsky, 2015).

A recent review showed that consuming up to seven drinks per week is not associated with AFib (Gallagher et al., 2017). Moderate consumption of one to two drinks per day was associated with an 11% increase in the risk of AFib development. However, moderate drinking was associated with a 26% increase of AFib development in men only.

Heavier drinking was associated with a 34% increase in overall risk of AFib development. Heavier drinking was also positively associated with incident AFib in men (68% increase) and in women (29% increase), meaning as the alcohol consumed increased, so too did the incidents of AFib. A second recent review of studies further clarified the link between different levels of alcohol consumption and AFib. The percentage increase in the likelihood of AFib at different levels of drinking was:

- 8% for 7 drinks per week
- 17% for 14 drinks per week
- 26% for 21 drinks per week
- 36% for 28 drinks per week
- 47% for 35 drinks per week (Larsson et al., 2014).

AFib is a relatively common heart problem that increases the risk of many other more serious cardiovascular diseases as well as mortality. While moderate drinking seems to have a protective effect for many other heart conditions, this is not the case for AFib. The risk of this heart problem increases systematically as alcohol consumption increases beginning at one drink per day. This is a clear indication of the dangers associated even with low level of drinking.

PERIPHERAL ARTERIAL DISEASE

Approximately 8.5 million people aged 40 and older in the United States have peripheral artery disease (PAD), a circulatory condition in which peripheral blood vessels become narrow due to plaque build-up in their walls (Benjamin et al., 2019). However, the association between drinking and PAD is not as well studied as that between alcohol and other cardiovascular diseases (Piano, 2017). Existing evidence suggests that like other cardiovascular diseases, moderate drinking appears to have a protective effect against PDA. However, the results are not always consistent.

For instance, in the Physicians Health Study, controlling for the effects of smoking, exercise, diabetes, and parental history of myocardial infarction, daily drinkers who consumed seven drinks per week or more had a 26% less chance of having PDA than drinkers who consumed less than one drink per week (Camargo et al., 1997). But in a study in the Netherlands, the protective effect of alcohol was found among women only. Non-smoking women with daily alcohol consumption of less than 1 drink, between 1 and 1.5 drinks, and more than 1.5 drinks had 35%, 34%, and 60% less chances, respectively, of having PDA compared to non-drinkers (Vliegenthart et al., 2002). In a review of various studies, Piano (2017) concluded there was a “weak positive or small inverse relationship between low to moderate alcohol consumption and PDA among men” and a moderate protective effect or no effect among women.

Chapter VI

ALCOHOL AND CANCER



“Cancer is awful. It took 10 years until I didn't think about it every day. Nobody should go through this. Nobody.”

- Hans Rosling

HERE'S WHAT YOU NEED TO KNOW

- Research demonstrates a link between firefighting and certain types of cancer
- Those who consume more than a moderate amount of alcohol are at a significantly higher risk for cancer
- Studies show firefighters are prone to heavy and binge drinking
- History of alcohol use is a factor when determining if a firefighter's cancer qualifies as job-related

Cancer is increasingly being recognized as one of the most significant health threats facing firefighters. The International Association of Fire Fighters adds more cancer-related line-of-duty deaths to their memorial wall than from any other cause of death. While research continues into the links between firefighting and cancers, researchers agree there is a significant relationship between the two.

One should not be surprised by the growing body of literature showing a higher risk of several different types of cancer among firefighters. Large-scale studies and meta-analyses (studies that combine results of several smaller studies) put the overall risk of cancer between 10% and 20% for firefighters.¹⁻⁶

Although increased cancer risk varies within specific types of cancer in the literature, firefighters have been associated with an increased risk for several cancers.

The upsurge in cancer among firefighters is believed to be related to several occupational risk factors. The most obvious risks are fireground exposures due to a battery of carcinogens in the air even after the fire is out. These carcinogens include benzene, asbestos, arsenic, trichloroethylene and several heavy metals.

SOMETHING IN THE AIR



Logic tells us that carcinogens can get into firefighters' bodies just through inhalation. However, we now know that the carcinogens can also enter the body through skin absorption, particularly around the neck, wrists and anywhere gear components meet — such as the sleeve cuff and glove top or the pant cuff and boot top. Unfortunately, the risks increase as the body heats up, and the high-intensity, short-term exposure tends to be one of the worst types of exposures.

Unlike a lost weekend in Las Vegas, what happens on the fireground doesn't stay on the fireground. The personal protective equipment (PPE) designed to keep firefighters safe can also be a risk. Carcinogens absorbed in into them from the fireground can be transferred to firefighters. This happens either through touch or inhalation as they off-gas in the rig. The hazard continues when gear is unloaded at the station. These are significant exposure periods.

Cancers Found To Be Increased Among Firefighters

- Bladder
- Brain
- Buccal Cavity and Pharynx
- Colon
- Intestine
- Kidney
- Leukemia
- Liver, Gall Bladder, Biliary
- Lung
- Malignant Melanoma
- Melanoma
- Mesothelioma
- Multiple Myeloma
- Non-Hodgkin Lymphoma
- Esophagus
- Prostate
- Rectum
- Skin
- Testis

Not surprisingly, the fire service is aggressively examining ways to decrease these cancer risks. Gross decontamination on the fireground, regular and thorough gear cleaning, wearing SCBA from arrival to leaving the fireground, clean apparatus cabs, and changes to the station design and environment are all measures being studied and implemented in the fire service. While quantifying the impact of these mitigation techniques will take time, it is likely these health-protection steps will eventually decrease the rates of cancer among firefighters.

Unfortunately, topics beyond preventing cancer from fireground exposures are receiving relatively little attention even though modifiable risk factors like alcohol consumption can contribute relatively more risk than work as a firefighter. When the risks of firefighting and excessive alcohol consumption are combined, the odds of cancer grow.

DANGEROUS SOLUTION

Alcohol has been classified as a Group 1 carcinogen, which is the highest level of evidence for a carcinogen based on biological, animal, and epidemiologic research.⁷ The International Agency for Research on Cancer (IARC) provides the following list of cancers related to alcohol consumption: mouth and throat (oral cavity, pharyngeal, and esophageal), skin (squamous cell carcinoma), liver, colon, rectal, and female breast cancer. While less consistent, some data also suggests a probable relationship between stomach and pancreatic cancers and alcohol consumption.

Risk of Cancer from FF vs. Alcohol

Type of Cancer	Increased Risk from Firefighting	Increased Risk from ~3.5 Drinks of Alcohol/Day
Oral/Buccal/Pharynx	40% ¹	83% ¹⁰
Esophageal	39% ¹ – 59% ⁵	123% ¹⁰
Liver	30% ¹	54% ¹¹
Colon	14% ³ – 21% ²	25% ¹²

Most experts say the leading cause for increased cancer risks from alcohol is when the body metabolizes ethanol. The process creates the carcinogenic metabolite acetaldehyde. This is the same culprit that causes hangovers.

Increased risks of cancers typically start at the point where people are consuming 3.5 drinks per drinking occasion. In a national survey of firefighters, those who drink alcohol reported an average of 3.5 drinks per occasion.^{8,9} The magnitude of the risk from alcohol consumption varies somewhat between 25%

and 123% depending on the type of cancer. Heavier drinking — which is seen in the fire service — brings with it even higher risks.

Here's where it gets scary. These increased risks tend to be higher than the increased risks associated with just firefighting. Because studies of firefighting and cancer compare firefighters to the general population — a general population that also consumes alcohol — these numbers cannot be compared directly. However, it does mean firefighters need to be more thoughtful about their alcohol consumption since they are already at increased risk of cancer from the toxic soup of known and unknown carcinogens on the fireground.

There is more bad news for people who report they only smoke when they drink. Research has found there is a strong interaction between smoking, alcohol, and the development of cancer. This mix particularly increases the risks of mouth and throat (oral cavity and esophageal) cancers.

In short, firefighters who use tobacco and drink heavily are voluntarily introducing more carcinogens into their body. Those carcinogens then team up with others picked up during firefighting operations to boost the odds a firefighter will develop serious cancers.

For firefighters, moderating drinking can be particularly important. When filing a claim for cancer, and particularly when fighting for coverage through a legal battle, personal risk factors are considered when determining if a cancer is job-related. For the cancers that are related to high alcohol consumption, the amount of alcohol consumed and the frequency of consumption may be considered as part of the decision. Lifestyle choices will come into play and could derail an otherwise legitimate work-related cancer claim.

While it seems like cancer is something that “will never happen to me,” data suggests it does happen to firefighters. When it comes to cancer prevention, moderating alcohol use to a healthy level is as important as doing gross decontamination on scene followed by properly cleaning all parts of the PPE ensemble, including the hood, helmet and gloves. Since firefighters have so many exposures on the fireground, managing controllable risks is vital.



Chapter VII

ALCOHOL AND SLEEP



“The best bridge between despair and
hope is a good night's sleep.”

~ Dr. Matthew Walker

HERE'S WHAT YOU NEED TO KNOW

- Sleep is vital for mental and physical health. Some experts say sleep is even more important for our well-being than diet or exercise.
- Firefighters struggle with sleep. Identifying ways to improve your sleep is an important part of promoting your health and safety.
- Drinking alcohol can disturb sleep and contribute to daytime fatigue, irritability, and difficulty concentrating.
- Going without alcohol for just 30 days leads to better sleep, improved health, more energy during the day, and weight loss.

It is conventional wisdom that firefighters get insufficient sleep. Well-intended retorts such as, “I’ll sleep when I am retired,” have become part of a culture where sleep deprivation is seen as a necessary part of the profession. This is partially true. Given their mission to protect the public 24/7, firefighters often get less sleep than is healthy.

However, even at busy stations, some firefighters prioritize sleep more than others. Many firefighters have optimized their sleep while accommodating their duties and have reaped impressive benefits. But many haven't.

Dr. Laura Barger and her colleagues at the Brigham and Women's Hospital in Boston examined sleep patterns and disorders in 6,933 firefighters from 66 fire departments.¹ She found that 37.2% of firefighters screened positive for a sleep disorder. Many of those who screened positive had obstructive sleep apnea, a sleep disorder that is a potent risk for heart disease.

Firefighters who had a sleep disorder were more than twice as likely to report falling asleep while driving or report having diabetes. They were also three times as likely to report depression or anxiety. In a similar study conducted in fire departments in the southwestern U.S., Dr. Joel Billings and Will Focht found that 73% of firefighters reported poor sleep quality².

These studies have three important implications for firefighters. First, sleep is important, and sleep deprivation leads to a host of negative consequences for health and safety. Second, many firefighters do not get sufficient sleep to support their physical and emotional functioning. Finally, although there are factors beyond control, there are things firefighters can do to improve sleep. One way to improve sleep is to change alcohol use.

Dr. Peter Attia is a popular fitness and longevity expert. His take on the importance of sleep to our overall health is common among healthcare professionals:

“Let's say you eat well, you exercise regularly, and you get adequate sleep. I'm going to take one of these strengths of yours away. Either your diet, your exercise regimen, or your sleep is going down the toilet. There's a catch: I'm allowing you to designate one of the three as untouchable. Which one do you guard? If I had to choose one to save, it would be sleep. Not even close.”³

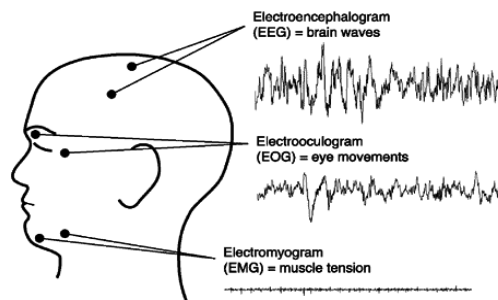
Alcohol use is one particularly important factor that many do not link to poor sleep. In a study funded by the National Institutes of Health, Carey and colleagues found that heavy alcohol use, poor sleep, and depression are linked⁴. A link between alcohol use and sleep problems has also been found in military personnel.⁵

“I did not feel well-rested after a day or two of drinking. I felt exhausted and unable to function like I had had a good night’s rest.” ~ Career Firefighter

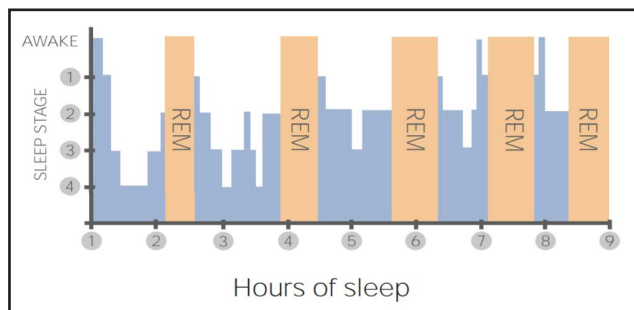
Given the importance of sleep to a firefighter's health and performance, let us take a brief tour of facts about sleep. We will end this chapter with how alcohol impacts sleep and ways you can reduce its negative impact.

HOW WE MEASURE SLEEP

We all have a subjective impression of how much we sleep. However, you sometimes may have the impression that you slept most of the night yet feel exhausted the next day. This is particularly true for those who have disorders such as sleep apnea.



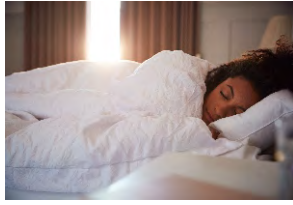
Researchers at the University of California, Berkeley, and at the London Institute of Psychiatry reviewed scientific studies that compared self-reports of sleep to polysomnography (PSG).⁶ PSG is also called a “sleep study” and measures your brain waves (EEG), eye movements (EOG), and muscle tension (EMG) to objectively quantify how well you sleep. These researchers found that many people overestimate how long it takes them to fall asleep and underestimate their total sleep time. Therefore, when discussing the impact of alcohol on sleep, it is important to consider how sleep is measured. The studies about alcohol and sleep reviewed below all used PSG to objectively measure characteristics of sleep after alcohol use.



When you sleep you cycle through two overall stages: non-rapid eye movement (NREM) and rapid eye movement (REM). There are four stages of NREM sleep. NREM Stage 1 is light sleep, and it is very easy to be aroused. As you drop deeper into sleep and it is more difficult to be aroused, you proceed through NREM stages 2, 3 and 4. As you progress through these stages, it is less likely that you will be

aroused by external factors. Although your muscles can function, during NREM sleep, muscle activity is low and eye movements typically do not occur. During REM sleep, you have rapid eye movements, your muscle tone is very low, and you can have intense dreams.

Each sleep cycles lasts about 90 to 110 minutes. These cycles begin in NREM sleep. As the night progresses, these sleep cycles will consist of less deep sleep (i.e., NREM stages 3 and 4) and more REM sleep. Thus, if your sleep is disrupted during the first half of the night, you get less deep sleep. If it is disrupted during the second half of the night, you will have reduced REM sleep. There are important health benefits to both NREM and REM sleep, so getting insufficient amounts of either will result in a host of negative outcomes.



Benefits of Deep Sleep

- Glucose metabolism supporting memory and learning
- Secretion of hormones which support growth and repair of tissues
- Energy Restoration
- Cell Regeneration
- Strengthens the immune system



Benefits of REM Sleep

- Remember and integrate existing knowledge
- Dissolve painful memories
- Increase creativity and problem solving
- Increase ability to manage emotions
- Increase pain tolerance

SLEEP NEEDS

The following table provides the National Sleep Foundation's recommended hours of sleep by age.⁸ The category “may be appropriate” is there because individual sleep needs can vary. However, while it is tempting to assume you are one of those rare people who do fine on the lower values in this category, that is almost never the case.

There is a known subvariant of the gene BHLHE41 that is associated with less sleep need of about six hours of sleep per night to maintain normal functioning.⁹ However, that gene variant occurs in only 1 of 12,000 people and probably doesn't apply to you (though, you could use one of the genetic profile services to check). The truth is, many accept a low level of exhaustion due to sleep deprivation as their norm which leads to impaired mental and physical performance, lower alertness, and reduced energy. If you want to be fit and healthy, getting serious about improving your sleep should be one of your top priorities.

Age	Recommended	May be Appropriate	Not Recommended
Teenagers 14 –17 years old	8 to 10 hours	7 hours 11 hours	Less than 7 hours More than 11 hours
Young Adults 18-25 years old	7 to 9 hours	6 hours 10 to 11 hours	Less than 6 hours More than 11 hours
Adults 26 to 64 years old	7 to 9 hours	6 hours 10 hours	Less than 6 hours More than 10 hours
Older Adults ≥ 65 years old	7 to 8 hours	5 to 6 hours 9 hours	Less than 5 hours More than 9 hours

Here are some facts to keep in mind as you think about how long you sleep.¹⁰

- If you only get 4 hours of sleep for 6 days (a bad week), that is equivalent to not sleeping for 24 hours.
- After 10 days of 7 or fewer hours of sleep, your brain is as dysfunctional as if you missed an entire night of sleep.









SLEEP AND HEALTH

Poor sleep will negatively impact your health, diminish your ability to think, and dramatically increase your risk of accidents and injury.¹⁰⁻¹² Sleep deprivation interacts with the known risks of firefighting to make them worse.

For example, we know that firefighters are at high risk of obesity and being overweight.¹³ Lack of sleep is a potent influence on how much you eat, how full you feel, and whether you make wise food choices. Similarly, sleep deprivation further increases the risk of cancer and heart disease, two leading causes of premature death among firefighters. Importantly, sleep deprivation increases the likelihood of making bad decisions, having an accident and being involved in a mayday. It is not an exaggeration to say that a sleep-deprived firefighter is a walking time bomb for themselves and their crew members.

Effects of Sleep Deprivation

Insufficient sleep impacts your mood, brain, and fitness in surprising ways

 <p>Increased Risk of High Blood Pressure</p>	 <p>Greater Risk of ✓ Forgetfulness ✓ Fuzzy Thinking ✓ Dementia ✓ Poor decision making</p>	 <p>40% increased risk of cancer 48% increase in heart disease risk</p>
 <p>Greater Risk of ✓ Depression ✓ Irritability ✓ Anxiety</p>	 <p>Decreased immunity 3X more likely to catch cold</p>	 <p>Damages telomeres, the caps on the end of your DNA</p>
 <p>More cravings for sweets Higher levels of hunger 50% higher risk of obesity If you get less than 5 hours sleep</p>	 <p>Results in ✓ 6,000 fatal car crashes per year ✓ Factor in disasters such as the Exxon Valdez and Chernobyl</p>	






Sources: Matthew Walker, Ph.D., Johns Hopkins University, National Sleep Foundation

FACTORS WHICH NEGATIVELY IMPACT SLEEP

Dr. Matthew Walker is a sleep specialist at the University of California, Berkeley. In his bestselling book *Why We Sleep*, he lists five factors that negatively impact sleep (see the table below).

Five Factors Which Negatively Impact Sleep

Matthew Walker, Ph.D. *Why We Sleep*

	<p>Artificial Light from Smartphones, Tablets, Television, and Computers</p> <ul style="list-style-type: none"> The LED lights in these devices emit blue light that is very close to daylight This tricks your brain into thinking it is not time to sleep 		<p>Caffeine Consumption</p> <ul style="list-style-type: none"> Typically results in poor sleep Even 7 hours after ingesting, half of the caffeine you consumed remains in your system. Caffeine disrupts NREM Sleep
	<p>Regulated Home Temperature</p> <ul style="list-style-type: none"> Your core body temperature must drop by 2-3 degrees to fall asleep Before modern times, the temperature of the environment fell right before we slept The ideal temperature for sleep is around 65 degrees Fahrenheit (18.3 degrees Celsius) 		<p>Alarm Clocks</p> <ul style="list-style-type: none"> Alarms trigger the fight or flight response Hitting the snooze button repeatedly shocks your central nervous system Ideal to train your body to wake up at the same time everyday
	<p>Alcohol</p> <ul style="list-style-type: none"> Causes fragmented sleep Drinking alcohol before bed harms memory and learning One of the most potent suppressors of REM sleep known to science 		

Particularly on duty days, firefighters may not be able to modify all five factors to benefit their sleep. For instance, you will often wake to alarms and may not be able to regulate the temperature of your sleeping room. However, you can avoid using caffeine in the afternoon and evening hours and explore ways to limit your exposure to blue light. For instance, try to avoid screen time from a phone, computer, or television in the hour before bed and wear blue light blocking glasses in the evening.

Importantly, you can always improve your sleep by limiting or eliminating alcohol use, particularly in the hours before bedtime.

HOW ALCOHOL IMPACTS FIREFIGHTER SLEEP

Dr. Lia Smith and her colleagues from the University of Houston examined alcohol use and disturbed sleep among a sample of 652 firefighters from a large metropolitan fire department.¹⁴ These researchers found “a significant incremental effect of alcohol use severity on global sleep disturbance among firefighters, above and beyond the covariates of years in the department and occupational stress.” That is, the more firefighters drank the worse their sleep, even when controlling for how long they had been a firefighter and their stress at work. For anyone who has read the extensive scientific literature on alcohol use and sleep, this finding is not surprising.

The quality of your sleep is negatively impacted by a combination of higher alcohol consumption and its proximity to your bedtime. In a nutshell, here are five things we know about the impacts of alcohol on sleep.¹⁵⁻¹⁸

1. Alcohol makes you fall asleep faster, at least at first. Alcohol use is associated with shorter sleep onset or the time it takes to fall asleep. However, over time you will develop tolerance to alcohol and will have to drink more to get the same sleep-inducing effect.
2. Alcohol suppresses melatonin. You might have a friend who takes melatonin to get better sleep since it is a hormone that regulates our sleep-wake cycle. Research has shown that even a moderate ¹⁹ dose of alcohol can reduce melatonin production by nearly 20 percent.
3. Alcohol reduces REM sleep. REM sleep is restorative and a critical part of our memory and learning ability. Alcohol is one of the most potent suppressors of REM sleep known to scientists.¹⁰
4. Alcohol increases sleep disturbances in the second half of the night. As your body metabolizes alcohol during the night, it undergoes a “rebound effect.” Rather than being a sedative, it results in lighter sleep and more frequent awakenings. You may not even be aware of these awakenings the next day, but they can be seen during a sleep study.
5. Alcohol can make breathing problems worse. Alcohol will relax the muscles in your throat, and you will be at greater risk of snoring and disordered breathing. Given that more than a third of firefighters have sleep apnea, the prospect of making this disorder even worse should be alarming.

Of course, the sleep disturbance caused by alcohol use will lead to tiredness, irritability, difficulty concentrating, and impaired performance the next day. The impact of alcohol on sleep disturbance is even stronger for females, an important factor for women firefighters.²⁰

"I noticed these problems on the nights where I drank in the evening. If I had a single glass of wine with dinner, the impact was modest, but I still noticed it. However, if I drank any additional alcohol or if I drank closer to bedtime, I was guaranteed to experience disrupted sleep. I finally had to decide that my sleep was more important to me than my wine habit. I will periodically have one glass of wine with dinner. Combined with the other sleep hygiene methods I have implemented, I'm getting the best sleep in my adult life at 59 years old."
~ Christopher K. Haddock, Ph.D., Fire Service Scientist

ACTION STEPS

If you drink and either have difficulty sleeping or typically feel tired during the day, do a 30-day experiment where you don't drink at all. Monitor how you sleep and your energy during the day and see if they improve. Remember, it often takes people two to three weeks to notice an effect.

Taking a 30-day break from drinking is very popular, particularly in the months of October (Sober October) or January (Dry January). However, don't wait until a special month - try it now. This break from drinking can have substantial health benefits. For instance, in a study of people who participated in a Dry January challenge, researchers at the University of Sussex in the United Kingdom found that 71% reported better sleep, 70% had improved health, 67% reported more energy during the day, and 58% lost weight.²¹ If you don't want to give up drinking for a month, try limiting your intake to one alcoholic beverage – preferably wine - at dinner. This is the drinking pattern recommended for the Mediterranean Diet,²² considered to be one of the healthiest diets you can adopt. If you change how you use alcohol, you may find that your sleep improves along with your health and well-being.



Chapter VIII

ALCOHOL AND FITNESS



“Take care of your body, it's the only place
you have to live.”

~ Jim Rohn

HERE'S WHAT YOU NEED TO KNOW

- Heavy alcohol use negatively impacts fitness by promoting body fat, increasing dehydration, and reducing testosterone levels.¹⁻³
- Alcohol is the second leading source of calories for firefighters. These are empty calories that do not feed the nutrients the body needs for physical activity.
- The previous day's drinking can negatively impact physical performance.⁴
- Alcohol negatively impacts recovery from exercise.
- Athletes who drink are more likely to be injured, and alcohol can slow healing from injury.²
- Moderate consumption will likely not negatively impact fitness or promote body fat. According to the Fire Service Joint Labor-Management Wellness-Fitness Initiative (WFI), alcohol is the most commonly abused substance among firefighters.⁵ Although a drink or two on occasion probably will not negatively impact your fitness or body composition, regular heavy drinking can damage your body. But the WFI also suggests regular physical activity is an effective tool to stay in shape, maintain occupational readiness, and relieve stress. Working out at home or at the station with minimal equipment for as little as 30 minutes delivers benefits such as decreased depression.

Unfortunately as we've shown in previous chapters, many firefighters drink heavily when they are off shift. For example, a large, national FEMA-funded study found that alcohol was the second-leading source of calories for firefighters.³ There is no doubt that exercise and fitness benefit firefighters. Likewise, there is no doubt alcohol can work against your efforts to stay lean and fit.

BENEFITS OF FITNESS

Not surprisingly, studies have consistently found better physical fitness is associated with better performance on job-related and simulated firefighting tasks.⁶⁻⁸ For example, in 2010 Sheaff and colleagues found that fitness directly predicted simulated fire group test performance.⁹ They also found that maximal aerobic capacity (VO₂max), a measure of cardiovascular fitness, was 23% higher in firefighters who successfully completed the Candidate Physical Ability Test (CPAT). Further, a combination of anaerobic fatigue resistance (how quickly you tire when doing a task) and aerobic capacity was remarkably good at predicting CPAT performance

In addition to increasing firefighter job performance, exercise is a potent treatment for depression and traumatic stress — two behavioral health challenges firefighters often face. In fact, a recent study indicates that exercise may also be one way to prevent depression.



This study found that those who reported no exercise were 44% more likely to be depressed in the future compared with those who exercised for 1 to 2 hours per week.¹⁰

While many career fire departments and some part-time or volunteer departments require passing a physical fitness test prior to joining, continuing annual fitness testing is uncommon. Firefighters usually begin their career physically fit. However, slow sustained annual weight gain can result in 30 to 85 pounds gained over the course of a career, putting extreme stress on the body.¹¹⁻¹³

Poston and colleagues found very high rates of overweight and obesity among career (79.5%) and volunteer (78.4%) firefighters. This was higher than the general population (71.6%), and most firefighters (61.3% career, 76.4% volunteer) exhibited substandard fitness levels.^{14,15}

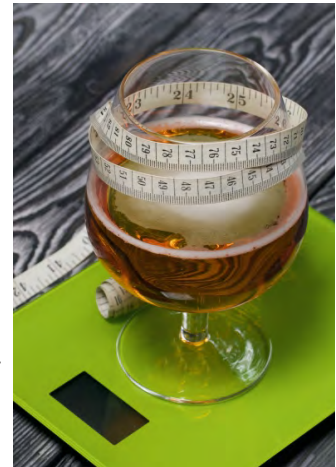
Obesity along with poor fitness often lead to injuries, cardiovascular disease, and even death.^{11,16} Important for firefighters, Jahnke and colleagues demonstrated that obesity was the only significant predictor of musculoskeletal injury among firefighters.¹⁷ Alarming, obese firefighters were 5.2 times more likely to experience this type of injury than were lean firefighters. Research has also documented that obesity is strongly related to how long a firefighter was absent from work because of an injury.

FIVE WAYS ALCOHOL IMPACTS FITNESS

Given that many firefighters struggle with weight gain and staying in shape, it is important to know how alcohol can make fitness and weight loss harder to attain.

1. Alcohol is High in Calories.

When we consume alcohol, we often don't think about all the calories we're taking in. Haddock and colleagues found that firefighters consumed an average of 539 kcals from alcohol, or nearly 18% of daily caloric intake. Twenty-five percent of firefighters consumed more than 770 kcals from alcohol in a single day.¹⁸



It is unrealistic to use physical activity to “burn off” excess calories from alcohol. For example, one 12-ounce can of beer has approximately 154 calories. If you have three beers (common for firefighters), that amounts to more than 450 calories you will need to burn. The general rule of thumb is that the average person burns 100 calories per mile of running. So, you would have to run 4.5 miles just to offset those three beers.

2. Alcohol Increases Dehydration and Makes It Harder to Recover from Exercise.

To recover properly from exercise, it is important to replenish glycogen stores, stimulate muscle protein synthesis, and restore fluid balance. Alcohol can interfere with many aspects of the recovery process. Beverages containing greater than or equal to 4% alcohol (most alcoholic beverages) increase urine output, ultimately delaying recovery from a dehydrated state.

In recreationally trained athletes, research has found that high alcohol intake after resistance training negatively impacts recovery.¹⁹ Due to alcohol's negative impact on performance and recovery, trainers often recommend athletes avoid alcohol 48 hours prior to an event.⁴

3. Alcohol Decreases Testosterone.

Alcohol decreases testosterone secretion. Therefore, excessive alcohol intake during the recovery period should be avoided for those striving for muscular hypertrophy or for those with hormonal imbalances. Moderate drinking (two drinks per day for men and one for women) may cause a slight decrease in testosterone for men. But heavier drinking can cause lower testosterone levels in men, higher levels in women, and fertility issues for both men and women.²⁰

4. Alcohol can Increase Blood Pressure.

Studies have found that alcohol significantly increases both systolic and diastolic blood pressure.^{21,22} If you often drink heavily, your alcohol use can lead to long-term increases in blood pressure.²³

5. Alcohol can Decrease Immune Function.

Frequent heavy alcohol use has been shown to depress immune functioning.⁴ Over time, alcohol's impact on your immune system can impair your body's ability to defend against infections and impede recovery from tissue injury.²⁴

RECOMMENDATIONS

The cumulative effects of binge drinking episodes may leave a firefighter unable to perform at the expected or desired level. It is critical that firefighters avoid heavy or binge drinking in order to stay fit and healthy. In addition, one easy way to cut body fat is to avoid alcohol. Here are seven additional tips firefighters can use to mitigate the effects of alcohol on their fitness.

1. Fully rehydrate and refuel post-exercise and post-shift before considering drinking alcohol.
2. Maintain a social life without compromising training and health goals.
3. When choosing alcohol, follow guidelines of moderation like those suggested by the federal government and the NCAA: one to two drinks per day for men, one drink per day for women. One “drink” equals 12 ounces of regular beer (150 calories), 5 ounces of wine (100 calories), or 1.5 ounces of 80-proof liquor (100 calories).^{25,26}
4. Plan ahead. Think about where you are going, who you will be with and how much you are going to drink. Also, plan how you will get home.
5. Share your goals. Discuss your training goals with friends, ask them to support your decision to limit alcohol or not drink at all, and engage in social activities that do not include alcohol.
6. Eat before or while you are drinking. Eating carbohydrate-rich foods after exercise helps replenish muscle fuel stores. Having food in your system slows down the rate at which alcohol can be absorbed into the blood stream. Eating while drinking also slows down your drinking pace and fills you up. This does not mean you can keep drinking as long as you are eating.
7. Pace yourself. If you do decide to have a drink, alternate alcoholic beverages with non-alcoholic ones. Start with a water, juice or soda. You will drink much faster if you are thirsty, so have a non-alcoholic drink to quench your thirst before you start drinking alcohol. Drink slowly, take sips rather than gulps and put your glass down between sips.

Chapter IX

ALCOHOL AND MENTAL HEALTH

“I thought I could control it,
until I realized that alcohol controlled me”-
Firefighter Suicide Note given to the
Firefighter Behavioral Health Alliance by family.



HERE'S WHAT YOU NEED TO KNOW

- Alcohol is a central nervous system depressant, meaning that it slows down brain functioning and neural activity.
- Those who drink 4 or more drinks per day have nearly 6 times the risk of hippocampus shrinkage in the brain compared to nondrinkers, which can result in cognitive decline.
- Alcohol has a significant impact on a firefighter's mood, behavior, thinking, and neuropsychological functioning.
- Heavy alcohol use can result in learning and memory issues. Heavy use negatively impacts the ability to process thoughts and make rational decisions.
- Heavy alcohol use is strongly associated with depression.
- According to the Firefighter Behavioral Health Alliance, alcohol use is strongly connected with suicides.
- Two-thirds of victims of spousal violence report that the perpetrator had been drinking
- Existing mental health issues are made worse by heavy alcohol use.

ALCOHOL AND THE BRAIN



It is conventional wisdom that moderate intake of alcohol (i.e., 1 or 2 drinks) can promote relaxation and feelings of positive well-being, particularly when paired with food and social interaction. Heavy drinking (2+ drinks for women and 3+ for men), on the other hand, is thought to result in mental health problems like depression and even violence because of its negative impact on the brain. The conventional wisdom about alcohol and brain health is backed by science. A recent study reported by the American

College of Cardiology¹ found that stress-related activity in the brain is higher in non-drinkers when compared with people who drank moderately, while people who drank heavily (more than 14 drinks per week) had the highest level of stress-related brain activity.

How does alcohol negatively impact your brain? Alcohol is a central nervous system depressant, which means that it slows your brain and neural activity. Heavy drinking can slow your central nervous system so much that you have slurred speech, have difficulty with movement, and are unable to react quickly. Long term heavy drinking can even shrink parts of your brain involved with your ability to think clearly. Among its functions, the area of the brain called the hippocampus plays a major role in learning and memory. Scientists² have discovered a dose-dependent relationship between alcohol consumption and shrinkage of the hippocampus, with those who drank 4 more drinks having 6 times the risk of shrinkage compared to nondrinkers. This is why scientists call alcohol a neurotoxin, or a substance that is destructive to nerve tissue.³ By drinking heavily or binge drinking you are harming the health of your brain.



ALCOHOL AND MENTAL HEALTH

Our mental health is impacted by many factors, including alcohol use. Scientists have discovered that alcohol can play a role in the development and progression of mental health problems and makes existing mental health problems worse^{4,5}.

The relationship between alcohol and mental health goes both ways. Drinking too much can lead to mental health challenges, and many people drink to manage mental health problems. If you are using alcohol to cope with depression, anxiety, or even job

stress, you risk making the problems worse long term. In comparison, seeking help from a counselor or a trusted friend, exercising and eating a healthy diet, and using techniques like meditation or mindfulness typically improve your mental health.

ALCOHOL AND DEPRESSION

The percentage of people with alcohol problems who have depression is high (63.8%), and there is a significant association between Alcohol Use Disorders Identification Test (AUDIT) scores (a measure of alcohol use) and level of depression⁶. Given the impact of alcohol on the brain, it is not surprising that alcohol's impact on our perceptions and thinking would make us more prone to depression. Alcohol can be like a pair of “shit colored glasses” – leading us to see the world as more negative and hopeless than it would seem if we were not under its influence. If you turn to alcohol to get through the day or to recover from a difficult shift, you are less likely to use coping strategies that lead to improved mood and well-being. In addition, when you drink too much, you are more likely to make bad decisions or act impulsively, making an otherwise manageable situation worse.⁷

ALCOHOL, VIOLENCE, AND CRIME

There is a strong relationship between alcohol and crimes. Alcohol plays a role in 40% of all violent crimes and 37% of people in prison report that they were drinking at the time they were arrested⁸. The role of alcohol in domestic violence is particularly scary. Two-thirds of those who are victims of intimate partner abuse report that their partner had been drinking. Alcohol, more than other drugs, is strongly associated with serious crimes like murder, rape, and assault. When you are drinking you are prone to make decisions you would not have made if your mind was not clouded by alcohol.

THE ROLE OF ALCOHOL AND SUICIDE IN FIREFIGHTERS

Since the Firefighter Behavioral Health Alliance (FBHA) began tracking and validating firefighters' suicides in 2011, it has investigated 1,615 fire, EMS and dispatcher suicides. Findings indicate the leading contributors to suicide among firefighters include marital challenges/relationships, depression, post-traumatic stress symptoms, medical/health problems, and addictions.

Often firefighters believe that alcohol is a way to manage the stress and behavioral health symptoms because it temporarily relieves the symptoms. Unfortunately, alcohol also impedes inhibitions which can lead to poor choices and – in the most severe instances – suicide.

RECOMMENDATIONS

Most people are familiar with the term resiliency, or the ability to recover from difficult struggles quickly. Resiliency begins by talking, whether that is talking to a peer support team member, a chaplain, a counselor, or a loved one. Other recommendations are:

- Practice self-care on a daily basis. Take 15 to 30 minutes every day to give your brain some rest. This can be music, yoga, exercise, writing, praying...it is different for everyone.
- Practice doing a check in with yourself. It means asking yourself “why am I acting or feeling this way?” The best thing we can do is to listen to others because they see us better than we see ourselves.
- Attend in-patient or outpatient treatments when alcohol has dictated your thoughts and your daily living. This is the bravest act we can do for ourselves and our families.
- Become involved in your department's behavioral health program. This is our greatest time for changes, not only within our departments but in our lives! Become the poster child for your organization. It will help more people than you will ever realize.

Chapter X

ARE ALCOHOL DRINKS NUTRITIOUS?



“Once, during Prohibition, I was forced to live for days on nothing but food and water.” — W.C. Fields

HERE'S WHAT YOU NEED TO KNOW

- Alcohol is not nutritious.
- Excessive alcohol consumption can increase risk of overweight and obesity. Binge drinking and overweight and obesity are highly prevalent health issues among firefighters.
- Alcohol was the second highest source of calories in firefighters' diets.
- Firefighters' calorie intakes from food and alcohol were almost five times the average of adult males.
- Avoid excessive alcohol consumption at least two days before a shift to prevent negative impacts on physical readiness.

For most of us, nutritional content is not the first thing that crosses our minds when we choose whether or not to have an alcoholic beverage. Most likely, it never comes into the picture. The factors we tend to consider first are what's on sale, what are my friends having, when is happy hour, what sounds good that day, or just what's available. However, we should be aware of the nutrient content of alcohol beverages we consume. In this chapter, we present the nutritional information of alcoholic beverages and the impact they can have on our body weight.

The science behind brewing, wine making, and distillation is fascinating, which is one reason so many of us enjoy visiting breweries, vineyards, and distilleries. We'll let you visit those destinations to learn how your favorite beers, wines, and liquors are made while we look together at the basic ingredients and nutrition facts for some popular beers, wines, and liquors.

Beer: Beer contains four basic ingredients: grain, water, hops, and yeast. The basic nutritional information of a light, regular, and India pale ale (IPA) beer is provided below.

Lite Beer

Nutrition Facts	
1 serving per container	
Serving Size	12 fl oz.
Amount per serving	
Calories	110
% Daily Value	
Total Fat 0g	0%
Saturated Fat 0g	0%
<i>Trans</i> Fat 0g	0%
Total Carb. 6.6g	2%
Total Sugars 0g	
Incl. 0g Added Sugars	0%
Protein 0.9g	
ABV: 4.2%	

Regular Beer

Nutrition Facts	
1 serving per container	
Serving Size	12 fl oz.
Amount per serving	
Calories	148
% Daily Value	
Total Fat 0g	0%
Saturated Fat 0g	0%
<i>Trans</i> Fat 0g	0%
Total Carb. 13.9g	5%
Total Sugars 0g	
Incl. 0g Added Sugars	0%
Protein 1.2g	
ABV: 4.6-5.0%	

India Pale Ale (IPA)

Nutrition Facts	
1 serving per container	
Serving Size	12 fl oz.
Amount per serving	
Calories	214
% Daily Value	
Total Fat 0g	0%
Saturated Fat 0g	0%
<i>Trans</i> Fat 0g	0%
Total Carb. 20.6g	7%
Total Sugars 0g	
Incl. 0g Added Sugars	0%
Protein 2.2g	
ABV: 6.7%	

Beer largely contains carbohydrates derived from the grains used to make it. Beer also contains small amounts of B vitamins and minerals. As expected for a 12-fluid ounce glass, a standard light beer contains about 25% fewer calories than a regular beer and about half the calories of an IPA. Light beer also contains the smallest alcohol by volume compared with regular and IPA beers.

Wine: The basic ingredients in wine include grapes, yeast, sugar, acid, and sulfur dioxide. There are more ingredients used, for example in the fining (filtering or clarifying) process, which largely depend on the type of wine and company preferences.

The difference between red and white wines is based on the types of grapes used and a major difference in the process in which the wine is made. For white wines, after the grapes are pressed the skins, seeds, and stems are removed prior to fermentation. For red wines, the pressed red grapes are fermented with the skin, seeds, and stems. The basic nutritional information of two each of commonly consumed white and red varieties is below:

Moscato
(White)

Nutrition Facts	
1 serving per container	
Serving Size	5 fl oz.
Amount per serving	
Calories	127
% Daily Value	
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	0%
Total Carb. 11.4g	4%
Protein <1g	
ABV: 10.0%	

Pinot Grigio
(White)

Nutrition Facts	
1 serving per container	
Serving Size	5 fl oz.
Amount per serving	
Calories	114
% Daily Value	
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	0%
Total Carb. 4g	1%
Protein <1g	
ABV: 13.4%	

Cabernet Sauvignon
(Red)

Nutrition Facts	
1 serving per container	
Serving Size	5 fl oz.
Amount per serving	
Calories	126
% Daily Value	
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	0%
Total Carb. 6g	2%
Protein <1g	
ABV: 13.2%	

Merlot
(Red)

Nutrition Facts	
1 serving per container	
Serving Size	5 fl oz.
Amount per serving	
Calories	119
% Daily Value	
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	0%
Total Carb. 4.1g	1%
Protein <1g	
ABV: 13.0%	

Wine largely contains carbohydrates derived from the grapes. Sweeter white wines contain higher amounts of carbohydrates than dryer white wines and red wines. Nutritionally, red wines contain more vitamins and minerals due to the inclusion of the beneficial plant compound-containing skins in fermentation. The calories (ranging from 114 to 127) and ABV (ranging 10 to 13.4 for a 5-fluid ounce glass) are similar across white and red wines.

Liquor: Distilled spirits include vodka, gin, rum, whiskey, and tequila. On average, a 1.5-ounce shot of distilled spirits contain 97 calories. There are no carbohydrates, fats, proteins, sugars, vitamins, or minerals in distilled spirits, which is what keeps their calorie count relatively low.

However, the alcohol by volume (ABV) values in distilled spirits is much higher than in wine or beer. The average ABV of all distilled spirits is about 40%.² Fruit liqueurs typically range from 28% to 32% ABV, gin ranges from 35% to 40% ABV, and vodka ranges from 35% to 46% ABV. Whiskey, rum, and tequila are 40% to 46% ABV, and cask-strength whiskey is 55% to 60% ABV.³

All alcoholic beverages contain varying amounts of ethanol which produces calories when digested. Ethanol is produced through fermentation of the basic ingredients in beer, wine, and liquor. It is the ethanol in beer, wine, and liquor that causes intoxication. Spirits are assigned a proof number which carries different definitions in different countries. In the U.S., that number is twice the ABV — 40% ABV equals 80 proof. In France, proof is the same as ABV; in England proof is about 57.06% of ABV.

If a drink is distilled, it makes the alcohol content even more concentrated and thus more calorie dense and dangerous as an intoxicant. Many people do not realize that every gram of alcohol consumed is converted to 7 calories. Typically, beer has the lowest amount of ethanol followed by wine and then liquor. Since alcoholic beverage consumption results in calories, it is very easy to add unexpected calories to your diet.

DOES ALCOHOL MAKE ME FAT?

Research on the association between alcohol intake and body weight shows some conflicting results. The published results differ due to several factors including the design of the studies, the way alcohol intake was measured, and the inclusion of other factors relating to lifestyle in the analytic design.

However, looking across all studies, current evidence suggests light to moderate alcohol intake does not lead to weight gain. Heavy alcohol intake and binge drinking are associated with weight gain. The association between alcohol and weight gain is stronger or more consistent among men.¹ Further, heavy drinking in young adulthood increases risk for overweight and obesity in later in life.²



There are several mechanisms that may be responsible for heavy and binge drinking contributing to weight gain.¹ When people drink an alcoholic beverage before or during a meal, research shows the extra alcohol calories consumed does not impact the amount of food people eat in the meal. However, research does show increased food consumption after alcoholic consumption. Alcohol influences numerous hormones and parts of the brain that regulate feelings of hunger.

In the largest study of firefighter nutrition to date, alcohol was the second highest source of calories on the list of the top sources of calories in firefighters' diets, behind chicken and turkey. Given firefighters can only consume alcohol off-duty, this finding is astonishing. Beer was the most consumed alcoholic beverage, followed by wine and liquor. The average amount of calories from alcohol alone on an off-duty day was 539 calories, and the range was 113 to 3,404 calories.³



To put the alcohol calorie amounts in comparison to food choices, below are calorie equivalents of food equal to the alcohol calories firefighters report consuming:³

The average calories firefighters consumed from alcohol is the equivalent to adding an additional McDonald's Big Mac (540 calories) to your diet in a day.

25% of firefighters consumed the calorie equivalent of 3½ large Snickers bars in a day (660 calories).

Firefighters who consumed the most calories from alcohol in a single day took in the equivalent of an entire large Pizza Hut Pepperoni Lover's pizza (3,440 calories).

Remember, these examples of alcohol calories consumed are in addition to food calories from meals. In firefighters, the high amount of alcohol drinking suggests the extra calories regularly consumed likely contribute to the high prevalence of overweight and obesity in the fire service.

Further, liquor drinks are often consumed with unhealthy mixers, including sugar-sweetened beverages, which adds even more calories to firefighters' diets. Lastly, since many people eat after a heavy- or binge-drinking episode — and those food choices are often unhealthy ones — the number of calories consumed in an off-duty day can truly be excessive. In this nutritional study among firefighters, they reported calorie intakes from food and alcohol were almost five times the average reported among adult males in the 2009–2010 National Health and Nutrition Examination Survey study.⁴



DOES ALCOHOL MAKE ME MALNOURISHED?

Alcohol can make you eat less. So, yes, alcohol can lead to malnutrition and increased risk of many chronic diseases. Let's look at three reasons this can happen.



First, most people who drink probably have experienced times when they began to drink before a meal. After a few drinks, they realized they just were not very hungry anymore. Alcohol adds empty calories, which make you think you do not need to eat as much. Empty calories provide energy but have no nutritional value. Remember, every gram of alcohol consumed produces 7 calories of energy for the body when digested.

Second, alcohol can make you eat more. Yes, that contradicts the first point. But alcohol can actually act on the body in opposite ways depending on the amount of alcohol consumed. While large doses of alcohol can suppress appetite, small doses can stimulate it.

Those who drink know the feeling you get when you have a drink and then start to get the munchies — you just want something to snack on. This is because alcohol is an addictive carbohydrate. Unfortunately, the types of food or snacks typically craved or available when drinking tend to include unhealthy carbohydrates, as well as salts and sugars. As you may guess, foods high in carbohydrates, with added salt and sugar, do not regularly appear on nutritionists' lists of healthy food.⁵

Finally, alcohol can make you gain weight, increasing the risk of becoming overweight and obese. Again, this may seem a contradiction. But overweight and obesity are a type of malnutrition — referred to as over nutrition. Overweight and obesity are defined by health professionals using the Centers for Disease Control and Prevention criteria using weight and height. A person with a body mass index greater than 25 and less than 30 is considered overweight and those with a BMI greater than 30 are considered obese.

The dietary intake of drinkers is often very deficient in healthy sources of calories, vitamins, and nutrients. Liquids have a less satiating factor than solids, and it is possible people do not compensate for the number of calories being consumed from the liquid, thus total dietary intake is higher than anticipated and weight gain results.⁶

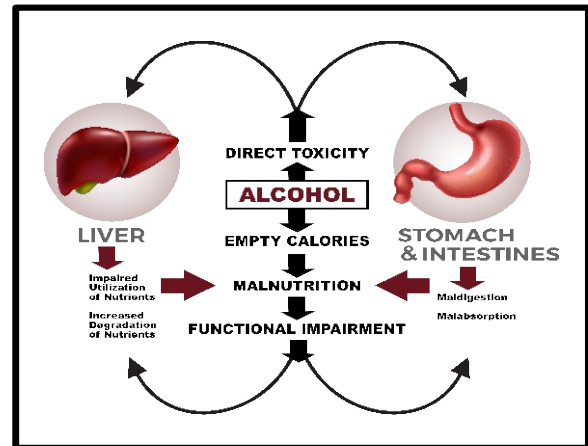
Obesity is a major health concern among firefighters. In large epidemiological studies, the prevalence of overweight and obesity together was nearly 80% and the prevalence of just obesity was greater than 30%.^{7,8} Alcohol intake is a likely contributing factor to the obesity epidemic among firefighters.³

Alcohol can displace nutrients and interfere with absorption, impacting health. The more calories an individual consumes from alcohol, the less likely it is they will eat enough high-quality food to obtain adequate nutrients. To make matters worse, chronic alcohol abuse not only displaces calories from needed nutrients, but also interferes with the body's metabolism of other nutrients, leading to damage to the liver, digestive system and nearly every organ.

The few nutrients the body is receiving are not fully absorbed due to frequent episodes of diarrhea. As result, the body is forced to use its stores of calories and nutrients leading to vitamin and mineral deficiency and depletion of electrolytes. The figure published by Lieber and colleagues depicts how malnutrition can result from excessive alcohol consumption. Heavy drinkers can actually starve their bodies with low food intake and poor food choices.⁹

Excessive consumption of alcohol affects more than just one's ability to think, speak, and move — it also has lasting effects on the nutritional resources in the body. Alcohol is also a diuretic, which means it increases urine output. This loss of urine causes a loss of water-soluble nutrients such as these.

Potassium that keeps many of your bodily systems functioning properly and maintains electrolyte balances, among other things.



Magnesium, an essential in a wide range of bodily functions including the nervous system, the liver and kidneys, and healthy digestion.

Folate, key to producing DNA and other bodily functions.

Zinc that maintains bones, muscles, hair and nails, as well as endless other important functions.

Alcohol can affect fitness and endurance. It is a toxin carried through the bloodstream to every organ and tissue causing dehydration and slowing a body's ability to heal itself. Many of you know the feeling of fatigue after a night of heavy drinking.

The body does not store alcohol and knows it must rid itself of the substance. The only fuels it can use to deal with alcohol are the limited critical nutrients that are normally used to look after the body. Getting rid of the alcohol becomes a priority for the digestive system because it cannot store it.

This means that it deals with the alcohol before anything else. Your liver must use essential vitamins — niacin, thiamine, and other B vitamins — to metabolize the alcohol. The body converts alcohol sugars into fatty acids, which do not add energy for the muscles. Alcohol calories do not convert to glycogen, lowering blood sugar levels after drinking. Low blood sugar can impact the ability of your muscles to respond quickly which affects speed and endurance. Alcohol triggers the liver to produce more triglycerides that circulate in the blood and can increase risk of heart disease.

RECOMMENDATIONS

While many individuals often think engaging in a few too many drinks only has an immediate impact (intoxication) or a headache the next morning, there are more side effects than you think, some with longer-term impacts. We all know excess alcohol consumption can result in what is known as a hangover. Common hangover symptoms include headaches, nausea, gastrointestinal issues, and fatigue.

Obviously, the more alcohol drunk the more likely symptoms will present. And while the body is hungover (ridding itself of the toxins), firefighters cannot perform at their peak capabilities — mentally or physically. Here are six recommendations to stay at top performance on the job.

- Avoid excessive alcohol consumption at least two days before the shift and any consumption one day before shift and stay adequately hydrated throughout your shift.
- To minimize dehydration when drinking alcohol, drink water between drinks and before going to bed.
- Low blood sugar is common after drinking, so consume a healthy meal after a night of drinking to replenish carbohydrates and other nutrients.
- Drinking alcohol can have both short- and long-term impacts on your body. Plan time before your shift to rest and restore your body. Drinking more than five drinks in one night can affect brain and body activities for up to three days. More than five drinks consumed for two consecutive nights affects brain and body functions for up to five days. Finally, attention span is noticeably shorter for periods up to 48 hours after drinking.
- Eat a nutritious meal before drinking to obtain adequate vitamins and minerals and to add a feeling of fullness, which may help curb excessive drinking.

Most importantly, stay within the moderate consumption guidelines. Keep a tally of drinks consumed and practice socializing without a reliance on alcohol.

Chapter XI

PERSONAL PROTECTIVE BEHAVIORS



“Begin with the end in mind.”
~ Dr. Stephen R. Covey

HERE'S WHAT YOU NEED TO KNOW

- Beginning with the end in mind is a key part of success for any endeavor.
- For alcohol, having clearly defined goals about how much and how often you will drink is critical to safety and health.
- Personal protective behaviors (PPBs), like drinking a glass of water between alcoholic beverages, can keep you safe and help you stick to your goals.
- It is critical that fire departments think of ways they can protect their personnel against the harms of excessive alcohol consumption.

One of the best-selling business books of all time is *The 7 Habits of Highly Effective People* by Dr. Stephen R. Covey. In his book, Dr. Covey draws on the success literature genre as well as his experience working with businesses around the world to identify the common factors linked to personal effectiveness.

“Begin with the end in mind” is the foundational habit on which the others depend. Those who begin with the end in mind embark on each task or project with a clear vision of their direction and destination. Since its publication, fire service leaders have used the 7 Habits to guide health and safety initiatives. For instance, more than 12 years ago, Chief Richard R. Anderson wrote in the Everyone Goes Home® Firefighter Life Safety Initiatives Program newsletter:

“A great planner once taught me 'Begin with the end in mind.' What better end than to eliminate preventable line of duty injuries and deaths.”¹

For alcohol use, beginning with the end in mind will help you clarify the role you want alcohol to play in your life and define how you would like occasions where you drink to unfold. Most people do not begin with a plan to drive while intoxicated, to be dependent on alcohol to deal with stress, to drink to excess where they lose control over their behavior, or to black out due to intoxication. They experience those unwanted outcomes because they did not have a plan that they are committed to following. There are ways to set your personal goals for drinking and use personal protective behaviors to reach those goals.



SETTING PERSONAL GOALS

The first step in “beginning with the end in mind” is to define the end you want, or in the case of alcohol, your goals for use. You may not have considered your alcohol use in this way, but alcohol is one of those substances that can be relatively safe to use at low intakes and very harmful if you drink excessively.

If you remember from Chapter 2, moderate drinking is defined as up to one standard drink per day for women of legal drinking age and up to two standard drinks per day for men. Based on this you can set goals like:

- The number of alcohol-free days per week.
- The total amount of alcohol you drink per day.
- The number of calories you get from alcohol.
- The money you want to spend on alcohol.

In the previous chapter, author Christopher Haddock related how he improved the quality of his sleep by cutting back on alcohol. One of his recommendations is to take a 30-day break from all alcohol consumption as a way to improve sleep and overall health. This break is also a good way to pause and reset your relationship with alcohol consumption.

Here are the four goals we recommend to every firefighter:

Goal 1: Limit your daily drinking to 2 (for men) or 1 (for women) standard drinks.

Goal 2: Although drinking more than moderately should be rare, avoid drinking more than three (men) or two (women) standard drinks on any one occasion. Be sure to consume these slowly — over more than 2 hours.

Goal 3: Do not drink if you are pregnant.

Goal 4: Do not drink within 12 hours of being on shift or responding to a call.

Below write down goals you would like to have for drinking. Be sure they are both realistic and will increase the likelihood you don't consume alcohol to excess.

Goal 1:

Goal 2:

Goal 3:

Goal 4:

PERSONAL PROTECTIVE BEHAVIORS

There are several strategies you can use to help you to stay in a healthy range of alcohol intake and to stick to your goals. These can be divided into three categories.

1. Preparing for High Risk Drinking Occasions

- Eat both before and while consuming alcohol. Do not drink on an empty stomach.
- Plan to leave situations involving alcohol at a predetermined time. As the night progresses temptations to drink to excess increase.
- Keep a 3x5 card (or note on your smart phone) handy that lists the reasons you want to stick to healthy drinking.
- Use a designated driver, ride share, or taxi to get to and from your destination. If you are with a group and select to use a designated driver, plan for who will stay alcohol-free. Do not wait until alcohol consumption has begun and rely on who is the “least drunk.”
- If you are at a bar or restaurant, decide how much you will spend on alcohol and stick to it.
- Have a “buddy system” where you and a family member or friend look after and encourage each other to not drink to excess.

2. Staying Safe While Drinking

- Set a limit on the number of standard drinks you will consume.
- Drink slowly. Drink a full glass of water between drinks.
- Avoid mixing different types of alcohol or unfamiliar drinks where you don't know the amount of alcohol they contain.
- Avoid shots. While they may seem like a good idea, they are designed to make you exceed your desired intake.
- Avoid drinking games.
- Focus on drink quality, not quantity.
- For safety, stop drinking one or two hours before going home.
- Even if it has been two hours since your last drink, don't drive.



3. Staying Safe as a Firefighter

- Be sure at least 12 hours have passed from “bottle to nozzle” or when you report for a shift (career firefighters) or respond to a call (volunteer firefighters).
- Pay attention to when and why you are drinking so you're aware if you're drinking to cope.

HIGH-RISK SITUATIONS

Another important factor in beginning with the end in mind is to identify situations where you may be tempted to exceed your goals for alcohol intake.

Typical high-risk situations can include these examples:



- Meeting at a bar right after shift
- Department functions
- Monthly meetings for volunteer firefighters
- Social events with other firefighters
- Negative emotions
- Not talking about stress
- Lack of coping mechanisms

Identify your likely high-risk situations and pick the PPBs listed below that you will use to stick to your goals. Create “if this, then that” plans before you face the situation. For example, if you have decided to stick to no more than three drinks at a gathering but most people are drinking to excess, then you can select these three PPBs:

1. Drink an 8-ounce glass of water after every serving of alcohol.
2. Carry a copy of the 3x5 goals card (or note on your smart phone) and review it while at the event.
3. Mentally rehearse the reasons you'll give when others pressure you to exceed your drink limit. For example, say that you need to be sharp the next day or that you have trouble sleeping if you drink to excess.

Below, list two situations where you think you will be tempted to exceed the drinking goals you have for yourself and your plan for using PPBs in those situations.

High Risk Situation 1:

PPBs you will use:

High Risk Situation 2:

PPBs you will use:

ENCOURAGE PERSONAL PROTECTIVE BEHAVIORS IN YOUR DEPARTMENT

In an article published in FireRescue1, Chief Darrly Kerley encourages firefighters “to have a courageous conversation about drug and alcohol abuse in the fire service.”² He cites the large number of reports in the media of firefighters who have ruined their careers due to excess alcohol use. For instance, he highlights a message from Chief Billy Goldfeder on the Secret List which reported:³

Date of Incident: 11/10/2017

Incident Description: Shortly after arriving on the scene of a motor vehicle crash, Firefighter Kendall James Murphy was struck and killed by another firefighter who was responding to the same accident scene in his privately-owned pickup truck. The second firefighter, who was allegedly driving under the influence of alcohol registering a blood alcohol level of 0.21 percent, was arrested and charged with operating a motor vehicle while intoxicated causing death and reckless driving.



Unfortunately, reports like this are numerous. Just search Google News for “Firefighter intoxicated” and you will find hundreds of reports. Chief Kerley encourages firefighters to raise awareness of the problems of alcohol in their department. Specifically, he suggests:

“If you want to be a mentor and teach mentoring to your firefighters, then teach responsible drinking also:

- Chief officers should not drink with the firefighters on a regular basis or encourage drinking, especially while traveling for a conference or training. Special events where social drinking is appropriate are acceptable, but not to the point of drunkenness.
- Drink in moderation, but don't exceed the recommended limits of five drinks for males and four drinks for females.
- Stop drinking 12 hours before reporting for duty or training – where your department is investing money in your professional development. Show up for class.
- If you are a volunteer or paid on call, do not respond if you have been drinking.”

These are excellent suggestions. We would also like to see fire departments commit to these five steps.

1. No alcohol in any department facility.
2. Not having events or celebrations that focus on alcohol.
3. Having limits on the number of drinks served during department events.
4. Stop serving alcohol at least two hours before an event ends.
5. Counsel personnel that pressuring their fellow firefighters to drink is not acceptable.

We also encourage you to share stories with your crew members about how excessive alcohol use has harmed firefighters and ruined their careers with your crew members. Encourage your department personnel to use the PPBs suggested in this chapter.

You could save a life and a career.

Chapter XII

SEEKING HELP FOR FIREFIGHTERS



F-E-A-R has two meanings:
“Forget Everything And Run” or
“Face Everything And Rise.”
The choice is yours. ‘ – Zig Ziglar

SELF AUDIT:



1) How often do you have a drink containing alcohol?

Never (0 points)

Monthly or less (1 point)

2 to 4 times a month (2 points)

2 to 3 times a week (3 points)

4 or more times a week (4 points)

2) How many drinks containing alcohol do you have on a typical day when you are drinking?

1 or 2 (0 points)

3 or 4 (1 point)

5 or 6 (2 points)

7 to 9 (3 points)

10 or more (4 points)

3) How often do you have 5 or more drinks on one occasion?

Never (0 points)

Less than monthly (1 point)

Monthly (2 points)

Weekly (3 points)

Daily or almost daily (4 points)

4) How often during the last year have you found that you were not able to stop drinking once you had started?

Never (0 points)

Less than monthly (1 point)

Monthly (2 points)

Weekly (3 points)

Daily or almost daily (4 points)

5) How often during the last year have you failed to do what was normally expected of you because of drinking?

Never (0 points)

Less than monthly (1 point)

Monthly (2 points)

Weekly (3 points)

Daily or almost daily (4 points)

6) How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

Never (0 points)

Less than monthly (1 point)

Monthly (2 points)

Weekly (3 points)

Daily or almost daily (4 points)

7) How often during the last year have you had a feeling of guilt or remorse after drinking?

Never (0 points)

Less than monthly (1 point)

Monthly (2 points)

Weekly (3 points)

Daily or almost daily (4 points)

8) How often during the last year have you been unable to remember what happened the night before because you had been drinking?

Never (0 points)

Less than monthly (1 point)

Monthly (2 points)

Weekly (3 points)

Daily or almost daily (4 points)

9) Have you or someone else been injured as a result of your drinking?

No (0 points)

Yes, but not in the last year (2 points)

Yes, during the last year (4 points)

10) Has a relative, a friend, a doctor, or another health worker been concerned about your drinking or suggested you cut down?

No (0 points)

Yes, but not in the last year (2 points)

Yes, during the last year (4 points)

Low risk (0 to 7 points):
You probably do not have a problem with alcohol.

Medium risk (8 to 15 points):
You may drink too much on occasion. This may put you or others at risk.

High risk (16 to 19 points):
Your drinking could lead to harm, if it has not already.

Addiction likely (20+ points):
It is likely that your drinking is causing harm.

**To get help:
Go to: www.aa.org or
Call: (212) 870-3400**



IF YOU ARE CONCERNED ABOUT YOUR DRINKING AND THINK IT WOULD BE BEST TO MAKE CHANGES – THAT IS THE FIRST STEP!

If you have chosen to change your drinking pattern and are looking for support, there are many solid resources you can use to increase your chances of success.

For general information about how to find effective support and treatment, the **National Institutes of Health** provides an excellent guide we recommend you consult.

On any computer, tablet, or smartphone go to this URL and access the information they provide: <https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/treatment-alcohol-problems-finding-and-getting-help>

If you are looking to manage your drinking and reduce its harm, many firefighters have used the **SMART** program which offers evidence-based methods to overcome addictive problems. According to their website:

Self-Management And Recovery Training (SMART) is a global community of mutual-support groups. At meetings, participants help one another resolve problems with any addiction (to drugs or alcohol or to activities such as gambling or over-eating). Participants find and develop the power within themselves to change and lead fulfilling and balanced lives guided by our science-based and sensible 4-Point Program®.

One former firefighter who now manages an addiction clinic serving firefighters, has said “[**SMART**] works in firefighter's a wheelhouse as they are internally driven to get it right”. To check out the **SMART** program, see: <https://www.smartrecovery.org/>

If you are having difficulty controlling your drinking and your goal is to become abstinent, consider contacting your local **Alcoholics Anonymous**. Many people find AA to be very helping in their journey to quit drinking. Their website has a number you can call to see if AA is for you or to get started: <https://www.aa.org/>

There are also several firefighter focused options for getting support to manage your drinking. If you are a member of the **International Association of Firefighters (IAFF)**, you can contact their alcohol program which was developed specifically for firefighters: <https://www.iaffrecoverycenter.com/>

You can also contact the **Rosecrance Florian Program for Uniformed Service Personnel**, which provides services to firefighters who want to address their drinking. The program is under the direction of Daniel DeGryse, a retired battalion chief with 30 years of experience working for the Chicago Fire Department and over 30 years of experience helping firefighters address their drinking. The URL for this resource is: <https://rosecrance.org/addiction-treatment/florian-program/>

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Texts

Text 1: Excessive alcohol intake may increase risk for overweight and obesity.

Text 2: Excessive alcohol intake three days prior to a shift can have negative effects on readiness.

Text 3: Alcohol is the second highest source of calories on the list of the top sources of calories in firefighters' diets.

Emails

Email 1: Researchers from the University of Texas School of Public Health and the Center for Fire, Rescue & EMS Health Research conducted a study on the nutrition habits of firefighters across the USA. They found alcohol was the second highest source of calories in firefighters' diets. Because firefighters are only allowed to drink while off-duty, this finding was shocking. The average amount of calories from alcohol alone on an off-duty day was 539 calories and the range was 113 to 3,404 calories³. The average 539 calories consumed from alcohol is equivalent to adding a McDonald's Big Mac to your regular diet on an off-duty day. Consuming empty calories from alcohol may increase risk for overweight and obesity.

Email 2: How much and how often you drink alcohol can impact your weight. Research has shown light to moderate alcohol intake has not been associated with weight gain, however heavy alcohol intake and binge drinking have been associated with weight gain. The association between alcohol and weight gain is particularly strong among men¹. In addition, how much you drink in young adulthood may impact your health later in life, including your risk for overweight and obesity². Research has shown a high percentage of firefighters are overweight and obese and binge drink. Further, research has shown firefighters gain an average of 1.2-3.4 pounds each year⁷. Avoiding excessive alcohol drinking may reduce the percentage of overweight and obese firefighters.

Email 3: Alcohol can act on the body differently based on the amount of alcohol consumed. Large doses of alcohol can suppress appetite, while small doses of alcohol can stimulate appetite. Often, the food choices or cravings while drinking involve unhealthy carbohydrates, with plenty of salt and sugar. The empty calories consumed from the alcohol, with the addition of the unhealthy snacks, result in large calories with minimal nutritional value. When considering excessive alcohol can reduce absorption of nutrients and increase urine output, and alcohol is the second leading sources of calories in the firefighter diet, firefighters may be at risk of malnourishment while consuming an excess number of calories. Malnourishment and dehydration may impact readiness.

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Authors



ALCOHOL 101: AUTHORS

Dr. Walker S. Carlos Poston, M.P.H.

Dr. Poston's research focuses primarily in the areas of obesity, tobacco control, and cardiovascular disease prevention with an emphasis on minority populations and military and first-responder health. He has been a principal investigator or co-investigator on grants from the American Heart Association (AHA), the American Legacy Foundation, the National Heart, Lung, and Blood Institute, the National Institute of Digestive Disorders and Kidney Diseases, the Agency for Healthcare Research and Quality, the Department of Defense US Army Medical Research and Material Command, and the Department of Homeland Security/FEMA. He also has been the recipient of a Minority Scientist Development award from AHA.

Dr. Sara Jahnke

Dr. Jahnke has over a decade of research experience on firefighter health, she has been the Principal Investigator on ten national studies as well as dozens of studies as a co-investigator. Her work has focused on a range of health concerns including the health of women firefighters, behavioral health, risk of injury, cancer, cardiovascular risk factors, and substance use with funding from the Assistance to Firefighters Grant R&D Program, the National Institutes of Health and other foundations. She has more than 100 publications in peer-reviewed medical literature.

Dr. Christopher K. Haddock

His professional background also includes training in data science and strength and conditioning. Dr. Haddock is an Accredited Professional Statistician (PStat®) with the American Statistical Association, a Fellow with The Obesity Society, and a Certified Personal Trainer with the National Strength and Conditioning Association (NSCA-CPT®). He has served as the Principal, Co-Investigator, or Biostatistician on a large number of National Institutes of Health, Department of Defense, Federal Emergency Management Agency, and American Cancer Society grants as well as foundation and private industry-sponsored grants and contracts. His current research is diverse, ranging from evaluating detection methods for toxic exposures among firefighters, PTSD treatment for military personnel, best methods to promote fitness and health among military and first response personnel, tobacco control research, and the impact of the opioid epidemic on veterans. Dr. Haddock has published over 200 scientific articles, most focused on first responder, military, and veteran's issues.

Dr. Nattinee Jitnarin

Dr. Jitnarin's research primarily focuses on health behavior (e.g., diet, exercise) and addictive behavior research, particularly tobacco use. She has a strong background in study coordination and experience in health outcomes research, specifically in statistics, epidemiology, and food and nutrition, as well as health-related behaviors. She has also been involved in the conduct and analysis of a number of large studies including cohort/observational studies and randomized controlled trials. Dr. Jitnarin currently serves as the Principal Investigator of the American Cancer Society-funded study focusing on developing and evaluating an occupationally-tailored smokeless tobacco cessation program in the U.S. Fire Service.

Dr. Christopher M. Kaipust, M.P.H.

Dr. Kaipust received his Master of Public Health in Epidemiology from the University of Texas School of Public Health (UTSPH). He then completed his Ph.D. in Epidemiology, and was a National Institute for Occupational Safety and Health (NIOSH) Doctoral Occupational Epidemiology Trainee at the Southwest Center for Occupational and Environmental Health at UTSPH. Dr. Kaipust serves as an Epidemiologist/Biostatistician in the Research Methodology and Data Analytics core at NDRI-USA, and in that role has been involved in the design, conduct, and analysis of several large studies on first responder, law enforcement, and military health and safety. His research focuses on Total Worker Health and health disparities in the occupational setting.

Dr. Brittany Hollerbach

Dr. Hollerbach received her Ph.D. in Kinesiology from Kansas State University and completed a postdoctoral research fellowship at Skidmore College under the direction of Dr. Denise Smith where she focused on cardiovascular disease in the fire service. Dr. Hollerbach has extensive experience working with the fire service on a number of federally funded firefighter studies examining behavioral health issues in the fire service including obesity, nutrition, physical activity, sleep, substance use, and mental health. She recently received FEMA funding as the Principal Investigator (PI) on a project examining firefighter perceptions of protective strategies used to mitigate the spread of COVID-19. Dr. Hollerbach has an interest in firefighter health in general and translation and dissemination of firefighter health research specifically, given her background as a former firefighter. She also has experience teaching at the fire academy and is well-connected to the fire service community in Kansas City.

Raul Caetano, M.D., Ph.D.

Dr. Caetano is a Senior Research Scientist at the Prevention Research Center, Pacific Institute for Research and Evaluation, Berkeley, California. He is also Professor of Epidemiology, Emeritus at the University of Texas School of Public Health. Dr. Caetano served as the Dean of the Southwestern School of Health Professions at the University of Texas Southwestern Medical Center from 2006 to 2014, and as the Regional Dean and Professor of Epidemiology, Dallas Regional Campus, University of Texas School of Public Health from 1998 to 2014. Dr. Caetano's research has focused on alcohol problems among U.S. ethnic minorities, particularly Hispanic populations. He has conducted both population surveys and clinical studies of alcohol use and alcohol problems among White, Black, and Hispanic populations. In addition, his work also has focused on psychiatric diagnosis and classification, and the associations between alcohol use and intimate partner violence.

ALCOHOL 101: AUTHORS, CON'T.

Dr. Susie Day, Professor of Epidemiology/Senior Scientist - University of Texas - School of Public Health in Houston

Dr. Day is an epidemiologist with over 35 years of experience in epidemiology, occupational health, nutrition, and health promotion working with multidisciplinary research teams. She has years of experience in design, implementation, and analyses of qualitative and quantitative research from both population- and intervention-based studies and community-based participatory research. She has used Intervention Mapping to aid development of interventions tailored to specific populations. Her studies have involved assessment of nutritional status, using both diet and anthropometric measures, in the etiology and/or prevention of obesity, heart disease, cancer and other chronic diseases as well as infectious diseases. Her work has involved ethnic, cultural and age diverse populations of adults, children and occupational groups in both US and international settings. She has been PI or Co-PI on 51 grants and subcontracts. Her leadership roles are extensive and include being the Director of the Total Worker Health Program for doctoral students for a NIOSH training grant, the Associate Dean for Research, Convener of the Epidemiology Discipline, and Director of the Human Nutrition Center.

Jeff Dill, Founder, CEO & Instructor - Firefighter Behavioral Health Alliance

Jeff is a twenty-six year veteran of the fire service, with volunteer and career experience. In addition, he has a Master's Degree in Community Counseling. He was the founder of Counseling Services for Fire Fighters in 2009 and Firefighter Behavioral Health Alliance in 2010. He travels across the United States and Canada providing educational workshops to firefighters on behavioral health issues such as addictions, depression, PTSD, relationships and suicide awareness. Jeff also educates counselors across the United States on how to work with the fire service and understanding the fire service culture.

Jeanne Barnhill, Senior Graphic Designer - NDRI-USA, Center for Fire, Rescue, and EMS Health Research (CFREHR) & The Science Alliance

Jeanne has worked in the advertising and design industry for 25+ years. Before joining NDRI-USA, Jeanne spent several years as a freelance designer working with a diverse group of brands. AIDS Service Foundation, National Fallen Firefighters Foundation, Bacardi-USA, AVION tequila, WHP Trainingtowers, Humane Society of Greater Kansas City, Titanic: The Artifact Exhibition - Union Station, Kansas City, Custom Color Corporation are just some of the many brands and companies she collaborated with. Jeanne leads by inspiring a positive culture, empowering teams, and fostering strong relationships. She has a priority to establish work methods that achieve a high level of quality, productivity, and speed. She specializes in taking ideas from conceptualization to finished products. Her experience encompasses a diverse background in a variety of mediums such as fine art, illustration, photography, advertising, and graphic design. Software mastery includes Adobe Creative Suite – Illustrator, Photoshop, InDesign, Acrobat Pro. Corel Draw, Microsoft Office

Daniel DeGryse, Program Director - Rosecrance Florian Program for Uniformed Service Personnel

Dan worked 30 years in the Chicago Fire Department. He began his firefighter career in 1989 and promoted up the ranks serving as a Lieutenant, Training Officer, Captain, and Battalion Chief before he retired in 2019. He also served as the Coordinator of the Chicago Firefighters' Union Local 2 Employee Assistance Program for 14 years serving its eight thousand members and their families. Dan has extensive clinical experience providing individual, group, and family therapy with both adults and adolescents in the area of addiction and mental health issues. Dan earned his bachelor's degree in Psychology in 1986 and has since earned certifications becoming a Certified Employee Assistance Professional (CEAP), a Certified Alcohol and Drug Abuse Counselor (CADC), a Certified Labor Assistance Professional (LAP-C), a Certified ARISE Interventionist (CAI) and holds advanced training in Critical Incident Stress Management (CISM).

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