# Health, Wellness, and Readiness in the Fire Service

Sara Jahnke, PhD Director & Principal Investigator Center for Fire, Rescue & EMS Health Research National Development & Research Institutes



# **Firefighter Health Research**

#### Firefighter Research PubMed 1974-2015











#### Heart Healthy Heroes AHA National 0830390N

Purpose: National Formative Study of Critical Health Issues in the Fire & Emergency Services

#### FIRE Study EMW-2007-FP-02571

Purpose: Longitudinal Epidemiologic Surveillance Study in the Fire & Emergency Services

#### Fuel to Fight Study EMW-2009-FP-01971

Purpose: Longitudinal Nutritional Epidemiologic Study in the Fire & Emergency Services, Ad36 The First Twenty for Volunteer Firefighters EMW-2013-FP-00983

The First Twenty in a Clinic Based Setting NIH 1R34HL125790-01

#### Women in the Fire Service: 1R21HL119024-01A1

Purpose: Mixed Methods Study of Female Firefighters' Health

#### Evaluation of NFFF's Stress First Aid: EMW-2014-FP-00945

Purpose: Cluster Randomized Trial of the SFA Intervention



#### Weekly

April 28, 2006 / Vol. 55 / No. 16

TABLE. Number and percentage of fatalities among career and volunteer firefighters, by cause/contributing cause — United States, 1994–2004

	Career		Volu	Volunteer	
Cause/Contributing cause	No.	(%)	No.	(%)	
Heart attack*	142	(39)	306	(50)	
Stress/Overexertion	138	(97)	301	(98)	
Other	4	(3)	5	(2)	
Motor vehicle-related traun	na 44	(12)	160	(26)	
Vehicle collision/crash	30	(68)	116	(73)	
Struck by vehicle	12	(27)	33	(20)	
Other vehicle-related (e.g., crushed by or fell from a vehicle)	n 2	(5)	44	(7)	
A set to motory	74	(0)			
Caught/Trapped	60	(20)	45	(0)	
Other (e.g., lost inside a structure or exposed to smoke)	18	(24)	14	(31)	
All other	108	(20)	00	(16)	
Caught/Trapped	32	(30)	19	(19)	
Fall	8	(7)	15	(15)	
Exposure (e.g., to smoke)	ğ	(8)	14	(14)	
Stress/Overexertion	16	(15)	14	(14)	
Structure collapse	8	(7)	3	(3)	
Other	35	(32)	34	(34)	
Total	368		610		

For example, myocardial infarction or armytrimia. Includes deaths caused by burns, cerebral vascular accidents, drownings, electrocution, heat exhaustion, and trauma.

For every cardiac LODD, an estimated **17** non-fatal cardiac events occur on duty each year. Cardiovascular disease is the leading cause of LODD and a major cause of morbidity among fire fighters.



## Causes of CVD



FIGURE 6. Theoretical model of atherosclerosis and possible adverse health outcomes in fire-fighters.

Soteriades et al., 2013

# Firefighters & Cancer



**Cancers Linked to Firefighting:** Lung Cancer Leukemia Malignant Mesothelioma **Stomach Cancer** Intestinal Cancer **Rectal Cancer Prostate Cancer Testicular Cancer Brain Cancer Multiple Myeloma** Buccal/Pharnyx Cancer **Oesophagus Cancer Kidney Cancer** Laryngeal Cancer

## **Risk Factors for Cancer**



# **Modifiable Risk Factors**

- Obesity
- Fitness
- Nutrition
- Sleep
- Shift Schedule
- Alcohol Use
- Tobacco Use
- Exposures



### **Obesity and Body Composition of Firefighters**





#### 12.0 METS\*



\*Donovan R, Nelson T, Peel J, Lipsey T, Voyles W, Israel RG. Cardiorespiratory fitness and the metabolic syndrome in firefighters. *Occup Med (Lond).* 2009;59:487-492.

# **Definition of Obesity**

#### BMI (kg/m<sup>2</sup>)

-Overweight =  $BMI \ge 25$  and <30 -Class I =  $BMI \ge 30$  and <35 -Class II =  $BMI \ge 35$  and <40 -Class III =  $BMI \ge 40$  ETTI IHNGE

Body Fat Percentage -Men, BF%>25; Women, BF%>30

<u>Waist Circumference</u> -Men WC>40 inches; Women WC>35 inches



#### **Overweight and Obesity Prevalence in the Fire & Emergency Services**



Firefighter Data from Poston et al., 2011: FIRE Study Range in the published literature, BMI  $\geq$  25: 73-88%

### **Obesity and Presumption Retirements/Disability**

Outcome	<b>Risk Factor</b>	Risk
Workers Compensation Claim	Obesity	≈300%
(Kuehl et al., 2012; PHLAME)	Status	increase
Disability (Soteriades et al., 2008)	BMI	5% increase
Non-CHD Retirement	Obesity	≈300%
(Holder et al., 2006)	Status	increase

#### Obesity and Injury-Related Absenteeism in a Population-Based Firefighter Cohort

Walker S.C. Poston<sup>1</sup>, Nattinee Jitnarin<sup>1,2</sup>, C. Keith Haddock<sup>1</sup>, Sara A. Jahnke<sup>1</sup> and Brianne C. Tuley

A consistent relationship has been demonstrated between obesity and absenteeism in the workplace. However most studies have focused on primarily sedentary occupational groups. Firefighting is a physically demanding profession that involves significant potential for exposure to dangerous situations and strenuous work. No studies to date have evaluated the impact of obesity on risk for absenteeism among firefighters. We examined the cross-sectional association between BMI and obesity and injury-related absenteeism. BMI, body fat percentage (BF%), waist circumference (WC), injury, and injury-related absenteeism were assessed in 478 career male firefighters, One hundred and fifteen firefighters reported an injury in the previous year and the number of days abs work due to their injury. BMI was an independent predictor of absenteeism due to injury even after adjustment for founding variables. Firefighters meeting the definition of class II and III obesity had nearly five times (odds ratio (OR) = 4.89; 95% confidence interval (CI) = 3.63-6.58) the number missed work days due to injury when compared rmal weight counterparts and their elevated risk was greater than firefighters with class . s I obesity (OR = 2.71; 95% CI = 2.01-3.65) or those who were overweight (OR = 2.55; 95% CI = 1.90-3.41). The attributable per capita costs of class II and III obesity-related absenteeism over the last year were \$1,682.90 per firefighter, \$254.00 per firefighter for class I obesity, and \$74.41 per firefighter for overweight. Our findings suggest that class II and III obesity were associated with substantial attributable costs to employers and our cost estimates probably underestimate the actual financial burden.

#### INTRODUCTION

Nonfatal occupational injuries represent a significant health problem for firefighters in the United States, with nearly 80,000 line of duty injuries reported in 2009 (1). The most common ause and type of injury is overexertion resulting in strain r sprain and the annual estimated costs for preventing and addressing firefighter injuries at a national level are estimated anarching includes in plants at anomal sets are common of the set in particular. Obese individuals may be a greater risk for occu-pational injury due to a number of factors including impaired mobility and fitness and apnea-related fatigue.

burden of obesity, related absentoeism has been estimated to be \$4 billion annually in the United States (19). Firefighting is a physically demanding profession that involves greater potential for y communing processor use involves greater potential for exposure to dangerous situations. However, obesity and low fitness levels are a growing problem for the US fire service (20–24). Thus, it is not surprising that obesity has been found to be a significant risk factor for dison obesity and loss of work productivity, including absenteeational injury due to a number of factors including impaired ism, represents a significant gap in the scientific literature (26), particularly among occupational groups engaging in strenuous However, the association between body weight or obesity and adagerous work activities such as freighters. The purpose nts a significant gap in the scientific literature (26). risk of nonfatal occupational injury is only modest in the limited of this study was to examine the association between nonfata reaction in the state of the st or obesity and missed work days or "absenteeism" (7-14). The lost productivity (e.g., sickness-related absenteeism and prescosts of missed work days also are higher among obese workers or with increasing BMI (9,12,15-18) and the national economic factors for occupational injuries among firefighters.

EPIDEMIOLOGY

Institute for Einholsekeni Haalth Rezaerth Nethoni Devalmment and Rezaerth Institute: Lewendt Kenser, USA-Nethoni Devalmment and Rezaerth Institute Public Health Solutions, New York, New York, USA, Correspondence: Walker S.C. Poston ( Received 21 December 2010; accepted 16 April 2011; advance online publication 2 June 2011, doi:



- Class II and III obese firefighters (BMI>35) missed nearly 5 times the number • of workdays than normal weight firefighters
- Excess costs associated with: overweight (\$74.41), Class I obesity • (\$254.00), and Class II and III obesity (\$1,682.90) per firefighter

# Incident Musculoskeletal Injuries

	Incident Injury	Incident MS Injury
Body Composition	•	
Obesity, BMI Defined (%)		
Normal Weight		*
Overweight	1.9 (0.7-5.2)	1.8 (0.4-8.6)
Obese	2.6 (0.9-7.4)	5.2 (1.1-24.5)
Obesity, Waist Circumference (%) under 40 inches		*
over 40 inches	1.9 (1.0-3.6)	2.8 (1.2-6.4)
Obesity, Body Fat Defined (%)		
Not Obese <25%		*
Obese	1.3 (0.7-2.5)	1.8 (0.8-4.0)
Fitness		
SRPA		
Physical activity	1.0 (0.8-1.1)	1.0 (0.8-1.3)
Maximum torso strength		
Max/Weight (SD)	0.5 (0.2-1.4)	0.8 (0.2-3.1)
Flexibility		
Average reach	0.9 (0.8-1.0)	1.0 (0.9-1.1)
* Risk adjusted models examining the as	ssociation between body	y composition and MS injur

controlled for age, smoking status, and physical activity

Jahnke et al., 2013

# **Reasons for Obesity Epidemic**

#### Addressing the Epidemic of Obesity in the United States Fire Service

A Report Prepared for the National Volunteer Fire Council



# Nutrition Environment in the fire house

- Irregular eating patterns
- Portion size, meal planning, and traditions
- Processed carbohydrates and sugar
- Metabolic impact of shift work
- Lack of support for physical activity in some departments
- Time constraints for healthy behaviors
- Behavioral health concerns

## Food in the Firehouse



# Meals as Bonding



"...just eating with them on those days I put on some weight and it's very difficult to do that because part of the fire service family is built around that kitchen table. That's where it takes place. That's where real problems are solved."

"Yeah, at some stations, just everybody just brings their own food in...You know, they have problems in their groups and they don't seem to cook up as much...just like guys that don't get along together."

# **Portion Sizes**

#### Best Potato Soup - Feeds 6-8 people or 4-6 firefighters

- 4 Cups potatoes, diced but unpeeled
- 1/4 LB butter
- 2 Cups finely diced yellow onions
- 1/2 Cup flour 1 Quart warm water
- 1/4 Cup chicken bouillon
- 1 Cup potato flakes
- 4 Cups half and half
- 1/2 tsp. Tabasco sauce
- Salt, Pepper, Garlic powder and Dried Basil to taste

Sauté onions in melted butter for 10 minutes in large kettle.

Add flour to onions and butter and cook for 5 minutes, stirring until flour is absorbed.

In a separate container combine, water, chicken bouillon, potato flakes, and seasonings.

Stir until no lumps remain.

Add to onion mixture, 1 cup at a time.

Add half and half, stirring until smooth and lightly thickened.

Reduce heat and simmer for 15 minutes.

In a separate pan, the potatoes should be covered with water and brought to a boil, and simmered for 20 minutes.

Drain potatoes and add to soup to complete. If too thick for taste, milk may be added to thin down.

Serve with chopped green onions and cheese ! sprinkled on top.

Cook time approx. 40 minutes

## Top 6 Sources of Calories

Preliminary Data



# **Standard Drink of Alcohol**



# **Definition of Binge Drinking**



Greater than 5 drinks within 2 hours for men Greater than 4 drinks within 2 hours for women



### Alcohol Use by Firefighters in Central US

Occupational Medicine doi:10.1093/occmed/kgs162

#### SHORT REPORT

#### Alcohol use among firefighters in the Central United States

C. K. Haddock, S. A. Jahnke, W. S. C. Poston, N. Jitnarin, C. M. Kaipust, B. Tuley and M. L. Hyder Center for Fire, Rescue & EMS Health Research, National Development and Research Institutes, Inc., Leawood, KS 66224, USA. Correspondence to: C. K. Haddock, Institute for Biobehavioral Health Research, National Development and Research Institutes, Inc., 1920 West 143rd Street, Suite 120, Leawood, KS 66224, USA. E-mail: keithhaddock@hopehri.com

Background	Although the US National Fire Service is concerned about alcohol use among firefighters, little research has been conducted on the topic.
Aims	To survey alcohol use patterns among career and volunteer firefighters.
Methods	Data were from a population-based cohort study of male firefighters conducted in randomly selected career and volunteer departments. Data were collected from 2008 to 2010.
Results	There were 656 participants from 11 career and volunteer 13 departments included in the study with a response rate of 97%. Career firefighters drank approximately 10 days per month (just about half of their off duty days) and drank relatively heavily on those days. Fifty-eight per cent of career and 40% of volunteer firefighters averaged three or more drinks and similar percentages reported binge drink tended to have the best health outcomes, while those who binge drank typically were at highest risk of negative health outcomes. Nine per cent of career and 10% of volunteer firefighters who drank self-reported driving while intoxicated in the previous 30 days.
Conclusions	Given the high rates of heavy and binge drinking, local and nationally coordinated efforts to increase the surveillance of drinking behaviour among firefighters and the development of targeted preven- tion interventions are critically needed

Key words Drinking; fire service; health

#### Introduction

Studies demonstrate a J-shaped relationship between alcohol intake and health, where moderate use is protective, while heavy consumption results in negative outcomes. Heavy alcohol use is associated with injuries [1], neurological impairment [2], social problems [3], liver disease [4] and cancer [5]. Given their critical role in public safety, the National Fire Service (NFS) is concerned about alcohol use by firefighters [6]. This study provides the first population-based examination of patterns of alcohol use in the NFS.

#### Methods

The data are from a large cohort study examining risk factors for injury among firefighters in the International Association of Fire Chief's Missouri Valley Region (Colorado, Iowa, Kansas, Missouri, North Dakota, Nebraska, South Dakota and Wyoming). Data were collected in 2008–10. Sampling methodology are presented in detail in a previous report [7].

The protocol was approved by the National Development and Research Institutes Review Board. Eleven career and 13 volunteer departments were randomly selected and contributed data to this study. The research team met with crews to overview the project, and of firefighters solicited, 97% agreed to participate. The survey was confidential and no individual results were provided to the department. Given the very small number of females, only data from male firefighters are presented.

Measurement items were modelled after previous occupational surveys. Items included the following: alcohol use—During the *past 30 days*, have you had at least one drink of any alcoholic beverage such as beer, wine, a malt beverage, or liquor?; amount drank– During the *past 30 days*, on the days when you drank, about how many drinks did you drink on the average?; Heavy Drinking

- 53% career
- 39% volunteers
- Binge Drinking
  - 56% career
  - 45% volunteers
- About 10% of firefighters reported driving while intoxicated in the past month

## Alcohol Use: Reasons

- *Shift Schedule:* "One thing that's different with us, though, I mean we work ten days a month, so we got a lot of days that we don't work the next morning. That's one reason why maybe that's my excuse, I don't know." Firefighter, Career
- Camaraderie: "I use it as an excuse to unwind on the four days, you know what I mean? You get together in a big group, go out, have a drink, tell war stories, laugh about stuff we did. Just act - act like exactly we did at the station, except do it with beer - with a drink." Firefighter, Career
- Stress Management: "The stress of the job...when you get off...you want something that will help you unwind." Firefighter, Career
- *Tradition:* "They (firefighters) all seem to be social and if you look back throughout the history of the fire service when my great grandfather was on up through the ranks what's union hall if there wasn't an open bar or a party somewhere." Chief, Career

## Alcohol Use and Abuse in a National Cohort of US Career Firefighters

Survey (All participants) Heavy Drinking: 44.7% Binge Drinking: 50.2% Average daily intake: 3.5 drinks



Dietary Recall (Off duty days)

Beer Drinks: 3.9 Wine Drinks: 2.0 Liquor Drinks: 6.8 Calories from alcohol:

- Average = 551.4 kcals
- Range = 12.5 to 3,404

### Big Mac and Average Calories from Alcohol

	NUTRITION FACTS Serving Size 7.6 oz	
	Calories 550	
11 12 2 2 2 3 3 3 3 3 4	Amount Per Serving	%Daily
	Total Fat 29g	45%
a farmer and a state of the second state	Saturated Fat 10g	50%
states a state of the states	Trans Fat 1.5g	
Contraction of the second s	Cholesterol 75mg	25%
	Sodium 1000mg	42%
	Total Carbohydrate46g	16%
Contraction of the second seco	Dietary Fiber 3g	13%
	Sugars 9g	
	Protein 25g	
	Calcium 260mg	25%
	Potassium 0mg	
	** Based on 2,000 calorie die	t

## 25% Drank the Caloric Equivalent of 3 Snickers Bars ( $\geq$ 774 calories)



## Can you outrun your dessert?





### 1 Pint – 1,360 calories

Running (5mph) 2 Hours, 5 Minutes

Race Walking 2 Hours, 30 Minutes

Walking-a-Dog Pace 5 Hours, 33 Minutes



### 12.8 grams

### 119.5 grams

#### 442.1 grams









Sisson (2009) The Primal Blueprint

Max: 834.2 g Carb/day

#### 5 mph

5 hours 6 min

25.5 Miles

**A MARATHON** 



### "Exercise is what gets you hurt"

# Line of Duty Injuries by Job Task



Data from Jahnke et al. 2013 Distribution similar to findings of Poplin et al., 2012

### **Exercise Injuries**

ARSTRACT

Downloaded from hypprevention.bml com on March 17, 2013 - Fublished by group bml com IP Online First, published on March 16, 2013 as 10.1136/injuryprev-2012-040662 Original article

> Injury among a population based sample of career firefighters in the central USA

Sara A Jahnke, Walker S Carlos Poston, Christopher Keith Haddock, Table 2 Type of injuries incurred by firefighters, baseline

Center for Fire, Rescue and EMS Health Research, National Development and Research Institutes, Inc. Leawood, Kansas, USA

#### Correspondence to

Dr Sara A Jahrlie, Conter for Fire, Rescue and EMS Health Res search, National Development and Research Institutes, 1920 W. 144: Stort, Sube 120, Leawood, VS 66224, LSA; sasiBh quehrLoom

Received 9 October 2012 Revised 27 December 2012 Accepted 1 February 2013 Background Rates of occupational highers among frelighters are high because of the physically demanting and variable tasks required by their job. While descriptive data about injuries exist, few studies have explored individual risk factors and their relationship to occupational injurv.

Methods The current study presents data from a population-based sample of 462 cancer firefighters from 11 narioonly-selected fire doputments in the Milliouri Valley region of the USA (Kansa, Missuin, Jowa, North Delota, South Jodota, Colrador, Wyonirg, Nehaska) who participated in a study evaluating risks for negative cardiovascular outcomes and injury. Relationships were examined between injury and demographic characteristics, body composition, fitness, and health behaviours.

Results: Participants were most likely to be injured during physical service and those who reported regular or duty exercise had a fourfield increase in risk for searcise related injury compared with those who did not exercise on duty (OR=4.06, 95% Cl 1.73 to 12.24). However, those who exercised were half as likely to sustain non-exercise injuries (OR=0.53, 95% Cl 0.32 to 0.85.

Condusions Findings highlight the benefit of physical training for firefighters despite the risk of injury during exercise.

Firefighting is a dangerous occupation with injury rates exceeding most occupational groups.1 The National Fire Protection Association (NFPA) reported 71875 firefighter line-of-duty injuries in 2010, with 20.8% of injuries resulting in time away from work.<sup>2</sup> Strains, sprains and muscular pain accounted for the largest portion of injuries (51.4%), followed by wounds, cuts, bleeding and bruising (17.590), and 'other' injuries (12.890). Poplin et al<sup>3</sup> examined a 5-year period of injury reports for Tucson firefighters and found that 32.9% were due to physical exercise, followed by patient transport (16.9%), training drills (11.1%) and fire ground operations (10.296). Sprains and strains were reported as the most common injury (56.296) followed by lacerations and contusions (15.598).

Firefighter injuries have significant economic costs. Walton et al.<sup>4</sup> studied firefighters from 77 municipalities in Illinois who field worker's compensation from 1992–1999. They found nearly a third of claims were for oreexertion, of which 83% were related to strain or sprain. The areage frefighters' worker's compensation claim was \$5168. Costs of injuries statianed by firefighters nationally were estimated between \$830–980

S Carlos Poston, Christopher Keith Haddock, million annually in 1997 de prevalence and associated o f the physically demanding fire service, understanding

factors for injury is an impetional health research. To date, studies examinin fighter injury largely focu

context and usually limit occurring on the fire grour et al,6 reported that fires with those in buildings with my resulted in a 400% and 250% when compared with fires those on a ground floor, resp et al.7 conducted a retrost injuries, and found that th factors to injury in the line situational awareness (37.49 wellness fitness (28.6% of inj (10.7% of injuries). While in tion and environmental con known about non-occupation health behaviours, fitness let that may be related to increase We located two studies d tionships between non-occ and firefighter injuries. Liao, tors of injury frequency and long that

	dina	l firefig	hter co	hor 💻			-
a	ge, 1	enure,	gender	, marital	status,	type	0
y	and	wage	were	signi fican	t predi	ctors	0
	-		-				

injury duration. Those who scored high on the Minnesota Multiphasic Personality Inventory scales associated with conflict, struggle, anger and respect for societal rules were injured more frequently and missed more work. However, all firefighter injuries were combined which limits the ability to look at whether predictors vary by type of injury. Heineman et al<sup>9</sup> explored risk factors associated with fire ground injuries in a retrospective casecontrol study and found that neither age nor experience were significantly related to risk of injury; rather, situational elements (eg. task being performed by firefighter when injured, location of the fire) were the most likely correlates of injury. Additional research that focuses specifically on the most common type of injury (musculoskeletal (MS) injuries) or the most frequent duty type when injured (exercise) will help expand the understanding of the role of non-occupational risk factors.

There is wide agreement that firefighters need to be physically fit to perform their job tasks. However, many departments naied concerns shout the potential for high injury rates occurring during exercise.<sup>10</sup> <sup>11</sup> In addition, little is known about predictors or correlates of exercise injurys among

Type of injury	% of firefighters	% of injuries
Dislocation, strain, sprain	18.8	763
Superficial injury, open wound	3.2	130
Concussion, internal injury	1.3	52
Fire/chemical burn, scald, frostbite	1.3	52
Fractures	0.4	1.7
Eye injury	0.4	1.7
Amputation	0.0	0.0
Acute poisoning, infection	0.0	0.0
Respiratory injury	0.0	0.0
Thermal stress/heat exhaustion	0.0	0.0
Heart attack, stroke	0.0	0.0
Other	0.2	0.9

Table 5 Relationship between exercise and non-exercise injuries

	Exercise injury OR (95% CI)
Those not regularly exercising on duty	-
Those regularly exercising on duty	4.60 (1.73 to 12.24)
	Non-œercise injury OR (95% CI)
Those not regularly exercising on duty	-
Those regularly exercising on duty	0.53 (0.32 to 0.85)

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# **Reducing Exercise Injuries**

- Warm ups
- Encourage scaling
- Discuss importance of proper form
- Functional exercises
- Time limitations
- Hydration
- Intensity
- Equipment availability



## **Cigarette Use Among Firefighters**

AMERICAN IOURNAL OF INDUSTRIAL MEDICINE

#### **Tobacco Use Among Firefighters in the Central United States**

#### C. Keith Haddock, PhD," Nattinee Jitnarin, PhD, Walker S.C. Poston, PhD, MPH, Brianne Tuley, BA, and Sara A. Jahnke, PhD

Background This study provides a comprehensive, population-based examination of tobacco use among both career and volunteer firefighters.

Methods Data are from a population-based cohort study of randomly selected career (N = 11) and volunteer (N = 13) departments comprised of 677 male firefighters. Results Unadjusted rates of smoking were 13.6% and 17.4% for career and volunteer firefighters, respectively. Smoking rates were less than a comparable occupational group (military personnel) and adult males in the states represented. Smokers were more likely to have been diagnosed with an anxiety disorder (OR = 5.8; P = 0.010), have an elevated CAGE alcohol problem score (OR = 2.9; P = 0.040), and more likely to report driving after drinking too much (OR = 4.5; P = 0.020) compared to never-smokers. Large percentages of career (18.4%) and volunteer (16.8%) firefighters used smokeless tobacco.

Conclusions Smokin g among firefighters is associated with other significant health and safety risks. High rates of smokeless tobacco use suggest that the fire service is an important target for intervention. Thus, despite strong statements against smoking by the fire service, the need to maintain high levels of health and fitness and relatively low smoking rates, a significant proportion of firefighters continue to use tobacco products. Am. J. Ind. Med. @ 2011 Wiley-Liss. Inc.

KEY WORDS: firefighters; fire service; tobacco; smoking; cigarettes; cigar; smokeless

#### INTRODUCTION

Firefighters are a vital component of our nation's conditions. Because of this, there has been a strong ememergency and disaster response system and are charged phasis on health promotion in the fire service, including with protecting the citizens and property in the communities they serve. The nature of this profession makes firefighting a physically and mentally demanding occupation.

Center for Fire, Rescue, & EMS Health Research, National Development and Research Institutes, Inc., Leawood, Kansas Contract grant sponsor: Federal Emergency Management Agency in the Department of

Homeland Security; Contract grant number: EMW-2007-FP-02571 \*Correspondence to: Dr. C. Keith Haddock, PhD. Centre for Fire, Rescue & FMS Health Re-

search, National Development and Research Institutes, Inc., 1920 West 143rd Street, Suite 120, Leawood, KS 66224. E-mail: keithhaddock@hopehri.com, haddock@ndri.org

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Firefighters must respond to emergencies on a moment's notice and often face dangerous and challenging work encouraging firefighters to be tobacco free. For instance, the Fire Service Joint Labor Management Wellness Fitness Initiative [WFI, 2008], the national model for health promotion in fire departments, suggests that all departments adopt the following policies toward tobacco use:

All new fire department candidates shall be tobacco free upon appointment and throughout their length of service to the department.

Current fire department uniformed personnel shall not use tobacco products (cigarettes, cigars, and/ or chewing tobacco) inside the work-site, within or on fire department apparatus, or inside training facilities.

#### **Unadjusted Rates of Current** Smoking 13.6% for Career Firefighters 17.4% for Volunteer Firefighters

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#### Rates of Smokeless Tobacco Use



#### **SLT Users Were:**

- Younger
- Had fewer years in the Fire & Emergency Services
- A small percent (15.7%) used because of departmental restrictions on smoking

### Sleep in the Fire & Emergency Services

- Sleep Disorders (37%; Barger et al. 2015)
  - Linked to: depression, CVD, crashes, diabetes, anxiety, obesity
- 48+ Hour Schedules
- Linking Shifts
- Busy Houses
- Private Quarters
- Sleep Promoting Environments

### **Excessive Daytime Sleepiness**

ORIGINAL ARTICLE

#### Excessive Davtime Sleepiness in Firefighters in the Cen United States

C. Ketth Haddock, PhD, Walker S.C. Poston, PhD, MPH, Nattinee Jitnarin, PhD, and Sara A. Jahni

Objective: To determine the prevalence and soverity of excessive daytime skepiness (HDS) in a population-based sample of firefighters. Methods: Sloepineos was assessed using the 1pworth Sloepineos Scale in a sample of male career firefighters (n=458) from 11 nandomly selected fire departments in the Midwestern United States. Results: Unadjusted HDS rates (13.7% and 14.0% for on- and off-duty, respectively) were similar to the general US population and comparable occupational groups. Pactors associated with HDS included 48-hour work shifts, non-private department sleep areas, and working a second job outside the fire service (P < 0.05). Conclusion: Owen frefighters' important role in public safety, concerns have been raised about whether firefighters' work schedules result in high rates of excessive sleepiness. Nevertheless, firefighters in this study did not have high rates of HDS despite their extended work schedule.

oncerns have been raised about firefighters' shift work sched-C ules and the potential impact of inadequate sleep on their health and safety and the well-being of those they serve during fire and emergency medical calls.<sup>1</sup> There is extensive scientific literature ing the negative impact of sleep deprivation in several shift-working occupational groups (eg, long-haul truckers, pilots, ship crew, and resident physicians) and the deleterious health effects of extended shifts and overtime 2-3 For example, extended shifts, night shifts, and overtime work have been linked to increased risk for fatigue, skeep disturbances, impaired mood, illnesses, negative cardiovascular outcomes, injuries, and impaired work performance.2,4 Given the work schedule of firefighters, it is possible that inadequate sleep is a significant occupational health risk in the US Fire Service. The literature documenting health and performance decre-

ments associated with shift work, however, typically compares work. ers on 8-hour shifts with those on extended 10- to 12-hour shifts, occupations requiring unusually long shifts (eg, extended resident physician call schedules lasting more than 30 hours, 40+ hour taxi driver schedules, long-haul truck drivers, etc), and workers accumulating more than 40 hours/week because of overtime, schedules that are not wholly reflective of typical work patients in the US Fire Service<sup>2,3</sup> US firelighters' most common work schedules are 24hour shifts on duiv/48 hours off. 24-hour shifts on duiv/24 hours off, 48-hour shifts on duty/96 hours off, or rotating 10-hour day shifts/14-hour night shifts, resulting in 8 to 12 days per month.3,4 Most fire departments allow rest periods and sleep during the shift

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and all firefishiers are provided extended periods of each shift. In contrast, resident physicians may field cal entire extended shift and not have opportunities for n haul truckers have reported driving for 24 hours in size studies.3

Firefighters also typically do not "work" the wi are on shift because they are allowed to sleep at night and are only awakened in response to nightitime emerge volume and demands of emergency calls vary greatly locality and even within any given department (eg, sor busier than others within the same department'), service the department (eg, first-responder, basic life support, support), and the number and types of firefighters on a fighter vs firefighter/paramedics), thus making genera other occupations about sleep disruptions and fatigue shift schedules difficult to make without directly stud Service personnel.

Little is known about the prevalence and epi sleep deprivation or extent of sleep disorders among L We could only locale two peer-reviewed scientific st review reporting the prevalence of skeep problems an ers. Bos and colleagues? compared Duich firefighters 24 hours on duty/48 hours off schedule, and office respect to various health complaints using a self-repo had a 55% response rate for the firefighters (80% reoffice workers). They determined that the prevalence fatioue for firefighters was similar to that of office we nificantly lower than the Duich general working popand associates' evaluated sleep deprivation in a small sample of 112 career firefishiers in the Northeastern and reported that 59% were "sleep deprived" based least one of the two criteria: (1) a score of 5 or g Pittsburgh Sleep Quality Index; (2) an Epworth Sle (ESS) score preater than 10. Nevertheless, only 8.9% v as sleep deprived based on their ESS score (Al-Zait communication, June 10, 2012). A recent article in 1

gency Medical Service? reported that a study of by the US Fire Administration documented that 2% of firelighters reported having skeep apnea, but they speculate that the rates may be as high as 10% to 15%.

Studies conducted to date are hampered by several factors that limit generalizability to US career firefighters and potentially introduce bias, including moderate response rate,7 a small convenience sample from one department using a different shift schedule than those most typical in the United Stales,<sup>8</sup> and lack of comparable measures and methods for estimating prevalence. The current study is the first population-based study examining the prevalence and sever-ity of sleep deprivation among US career firefighters using one of the most extensively tested and used measures of excessive daytime sleepiness (EDS) allowing comparisons across multiple populations and occupational groups.10-12

#### METHODS

Participants and Procedures The protocol for the protection of human subjects for this study was approved by the National Development and Research

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FIGURE 1. Firefighter Epworth sleepiness scores on and off duty. Dotted vertical line represents Epworth cutoff score for excessive davtime sleepiness.

> Factors associated with EDS included a 48 hour schedule, shared sleep area in department, and a second job outside fire service.

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## **Behavioral Health**

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### Firefighting and mental health: Experiences of repeated exposure to trauma

Sara A. Jahnke<sup>k,\*</sup>, Walker S. Carlos Poston<sup>a</sup>, Christopher K. Haddock<sup>a</sup> and Beth Murphy<sup>b</sup> <sup>a</sup>Center for Fire, Rescue & EMS Health Research, Institute for Biobehavioral Health Research, National Development & Research Institutes, Leawood, KS, USA <sup>b</sup>Integrative Mental Health and Wellness, Bellewe, WA, USA

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#### Abstract.

BACKGROUND: Firefighters must be ready to respond to a broad range of emergencies every duty day. In the course of many of these emergencies, firefighters witness events which fave the potential to induce emotional transa, such as budy injured people, deceased children, and induviduals who are highly distragraph. Previous research suggests that repeated exposure to these traumas (RET) may have negative impacts on the emotional and mental health of fire service personnel. Research on the mental health of firefighters has been limited to small surveys reporting the prevalence of specific mental health problems such as depression and post-traumatic stress filorofter among firefighters.

OBJECTIVE: Despite the likelihood that RET leads to negative outcomes in firefighters, data is lacking on how exposure impacts fire service personnel. The current study examines the experiences of firefighters related to RET. METHODS: Using formative research methods, we examined the beliefs and experiences of firefighters and administration administration.

from across the United States regarding the impact of RET on firefighter health. RESULTS: Study findings highlight the cumulative psychological toll of repeated exposure to traumatic events including

desensitization, flashbacks, and irritability. CONCLUSION: Results of the current study suggest that RET is a significant concern for emergency responders that

CONCLOSION Results of the current study suggest that Ref. is a significant concern for emergency responders that warrants additional research and attention. It is help that the long term consequences of RET are closely intertwined with other mental health outcomes and general well-being of this important occupational group.

Keywords: Firefighters, mental health, depression, post-traumatic stress, trauma, EMS

#### 1. Introduction

With significant declines in the number of fires nationally over the past several decades (e.g., only 5% of calls being were actual fires in 2011; [1]), firefighters' responsibilities have shifted from primarily engaging in fire suppression activities to include a broad range of emergency response operations. Present-day firefighters are responsible for

\*Address for correspondence: Sara A. Jahnke, Ph.D. Director & Principal Investigator, Center for Fire, Rescue & EMS Health Research, Institute for Biobehavioral Health Research, 1920 W. 143rd Street, Suile 120, Leawood, KS 60224, USA. Tel: +1 913 681 0300, Faz: +1 913 681 0315; E-mail: Jahnke@ndri.org, rescue operations, hazardous materials management, responding to natural disasters and domestic attacks, and providing emergency medical services. Medical calls typically include a range of needs from simple sprains and strains on a basebull field to wide variety of potentially traumatic events including a parent who is experiencing a heart attack, a child who has drowned in a swimming pool, a car accident that has mutilated an adolescent, a fire with possible trapped victims, or a terrorist attack. A common saying in the fire service, as quoted by the 2005 documentary *Into the Fire* is that "Your worst day is our everyday" [2]. Not surprisingly, it has been suggested that regular exposure to these events may have a negative psychological toll on firefibethers' mental health.  Post Traumatic Stress Symptoms

Anxiety

Depression

Suicide

 Substance Use/Abuse

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# What to do?



- Eliminate tobacco use
- Focus on obesity intervention
  - Nutrition processed foods and sugars
  - Fitness across domains, function
- Implement department wellness programs
- Clean gear (hoods, gloves)
- Wear SCBAs
- Regular, relevant, physical ability testing
- Appropriate medical surveillance and intervention



"Because when we hit the fire ground, your risk factors become my risks."

~ Firefighter Steve Mast

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