



# MnFIRE & the Hometown Heroes Program

*Impacting Firefighter Health Statewide*

---

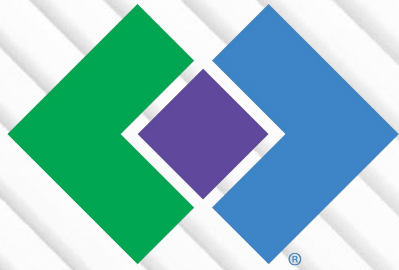
# MnFIRE



Nick Blonien & Wayne Kewitsch

*CSOEMA Fall Seminar 2023*

# Agenda



HealthPartners®

- Firefighter health overview
- CVD, mental health, and cancer
- Local initiatives



- Organization overview
- Hometown Heroes Program
- Successes, Challenges, and Outlook

# Lifestyle Medicine / Big 3



NUTRITION



EXERCISE



TOBACCO  
& ALCOHOL



STRESS  
MANAGEMENT



SLEEP



HEALTHY  
RELATIONSHIPS



Cardiovascular Disease



Behavioral Health



Cancer



# Sleep

- Suboptimal shift/environment
- Low priority at home
- Poor sleep in 51.4% <sup>1</sup>



↑ odds of CVD <sup>2</sup>



↑ odds of anx/dep <sup>2</sup>



↑ risk of FF-associated cancers <sup>3</sup>

Positive Sleep Disorder Screening vs. No Positive Sleep Disorder Screening

	Positive Outcome with Positive Sleep Disorder Screening n (%)	Positive Outcome with Negative Sleep Disorder Screening n (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI) <sup>e</sup>
Motor vehicle crash <sup>a</sup>	48 (2.0)	46 (1.2)	1.71 (1.14–2.57) p = 0.0101	2.00 (1.29–3.12) p = 0.0021
Near crashes <sup>b</sup>	451 (18.5)	345 (8.7)	2.38 (2.04–2.76) p < 0.0001	2.49 (2.13–2.91) p < 0.0001
Nodding off or falling asleep while driving <sup>b</sup>	498 (20.7)	418 (10.7)	2.17 (1.89–2.50) p < 0.0001	2.41 (2.06–2.82) p < 0.0001
Injuries	391 (16.1)	327 (8.3)	2.13 (1.82–2.49) p < 0.0001	2.17 (1.85–2.55) p < 0.0001
Cardiovascular disease <sup>c</sup>	60 (2.4)	36 (0.9)	2.78 (1.83–4.22) p < 0.0001	2.37 (1.54–3.66) p < 0.0001
Diabetes <sup>c</sup>	98 (3.9)	55 (1.3)	3.01 (2.15–4.20) p < 0.0001	1.91 (1.31–2.81) p = 0.0009
Depression <sup>c</sup>	266 (10.5)	143 (3.5)	3.29 (2.66–4.05) p < 0.0001	3.10 (2.49–3.85) p < 0.0001
Anxiety <sup>c</sup>	165 (6.6)	78 (1.9)	3.66 (2.78–4.82) p < 0.0001	3.81 (2.87–5.05) p < 0.0001
Lower health status <sup>d</sup>	1,438 (55.9)	1,317 (31.1)	2.81 (2.54–3.11) p < 0.0001	1.92 (1.71–2.15) p < 0.0001

<sup>a</sup> Yes vs. no. <sup>b</sup> At least once vs. zero. <sup>c</sup> Yes vs. never or not now. <sup>d</sup> Poor, fair, good vs. very good, excellent. <sup>e</sup> Adjusted for age, gender, BMI, cigarette smoking, and alcohol consumption. Variables included in each model are in Table 5. OR, odds ratio; CI, confidence intervals.



# Nutrition

- Large meals, poor timing <sup>4</sup>
- Standard American diet <sup>5</sup>
- 71% don't follow guidelines <sup>6</sup>



↑ risk for cardiometabolic disease



↑ risk of depression vs. MED diet <sup>7-9</sup>



↑ risk of cancer vs. MED diet <sup>6</sup>



*nutrients*



5

Article

## Eating Habits among US Firefighters and Association with Cardiometabolic Outcomes


Andria Christodoulou <sup>1,\*</sup>, Costas A. Christophi <sup>1,2</sup> , Mercedes Sotos-Prieto <sup>2,3,4,5,6</sup>, Steven Moffatt <sup>7</sup> and Stefanos N. Kales <sup>2,8</sup>

Table 5. Association of dietary patterns with cardiometabolic outcomes.

Outcome	Unadjusted Models						Adjusted Models *					
	Standard American Diet			Mediterranean Diet			Standard American Diet			Mediterranean Diet		
	$\beta$	se	p	$\beta$	se	p	$\beta$	se	p	$\beta$	se	p
BMI	0.23	0.23	0.292	0.15	0.24	0.527	0.02	0.19	0.922	0.30 **	0.21	0.150
Body Fat	0.45	0.33	0.166	−0.22	0.35	0.537	0.26	0.27	0.331	0.02 **	0.20	0.943
Cholesterol	4.58	1.86	0.014	0.85	1.92	0.657	4.49	1.84	0.015	1.18	2.02	0.559
HDL cholesterol	−0.59	0.56	0.29	1.14	0.57	0.045	−0.292	0.52	0.578	1.20	0.57	0.036
LDL cholesterol	3.88	1.61	0.017	−0.03	1.66	0.985	3.76	1.63	0.022	−0.31	1.79	0.865
Cholesterol ratio	0.14	0.06	0.033	−0.08	0.07	0.244	0.12	0.05	0.026	−0.05	0.06	0.358
Triglycerides	7.73	3.69	0.037	−0.09	3.79	0.982	5.83	3.43	0.090	1.37	3.75	0.715
Glucose	−0.53	1.00	0.594	−1.05	1.02	0.305	−0.97	0.94	0.506	−0.01	1.03	0.990

\* Adjusted for gender, max METS, VO<sub>2</sub> max, age, BMI, and body fat percent. \*\* Adjusted for gender, max METS, VO<sub>2</sub> max, age. Se, standard error.





# Exercise

- 1/3 don't meet guidelines <sup>10</sup>
- 54% no/minimal activity <sup>11</sup>
- Anecdote: many with VO2max <42



↓ CRF = ↑ CVD risk <sup>12</sup>



16% decreased risk of occ stress <sup>11</sup>



↓ risk, ↑ survival <sup>13</sup>



International Journal of  
Environmental Research  
and Public Health



12

Systematic Review

## Association between Cardiovascular Disease Risk Factors and Cardiorespiratory Fitness in Firefighters: A Systematic Review and Meta-Analysis

Jaron Ras <sup>1,\*</sup>, Andre P. Kengne <sup>2</sup>, Denise L. Smith <sup>3</sup>, Elpidoforos S. Soteriades <sup>4,5</sup> and Lloyd Leach <sup>1</sup>

2018 Physical Activity Guidelines Advisory Committee Evidence on Relationship between Physical Activity and Risk of Developing Invasive Cancer

Cancer	Overall Evidence Grade	Approximate % Relative Risk Reduction	Dose-response? Grade
Bladder	Strong	15%	Yes, moderate
Breast	Strong	12 – 21%	Yes, strong
Colon	Strong	19%	Yes, strong
Endometrium	Strong	20%	Yes, moderate
Esophagus (adenocarcinoma)	Strong	21%	No, limited
Gastric	Strong	19%	Yes, moderate
Renal	Strong	12%	Yes, limited
Lung	Moderate	21 – 25%	Yes, limited
Hematologic	Limited	Variable effect sizes	Not assignable
Head & Neck	Limited	Variable effect sizes	Not assignable
Ovary	Limited	8%	Yes, limited
Pancreas	Limited	11%	No, limited
Prostate	Limited	Variable effect sizes	Not assignable
Brain	Grade not assignable	Variable effect sizes	Not assignable
Thyroid	Limited	0	Not assignable
Rectal	Limited	0	Not assignable

13



# Substance Use

- Caffeine = 542 mg/day <sup>14</sup>
- Alcohol = common mis-use <sup>15-18</sup>
- Tobacco = ↓ smoking, ↑ SLT <sup>19</sup>



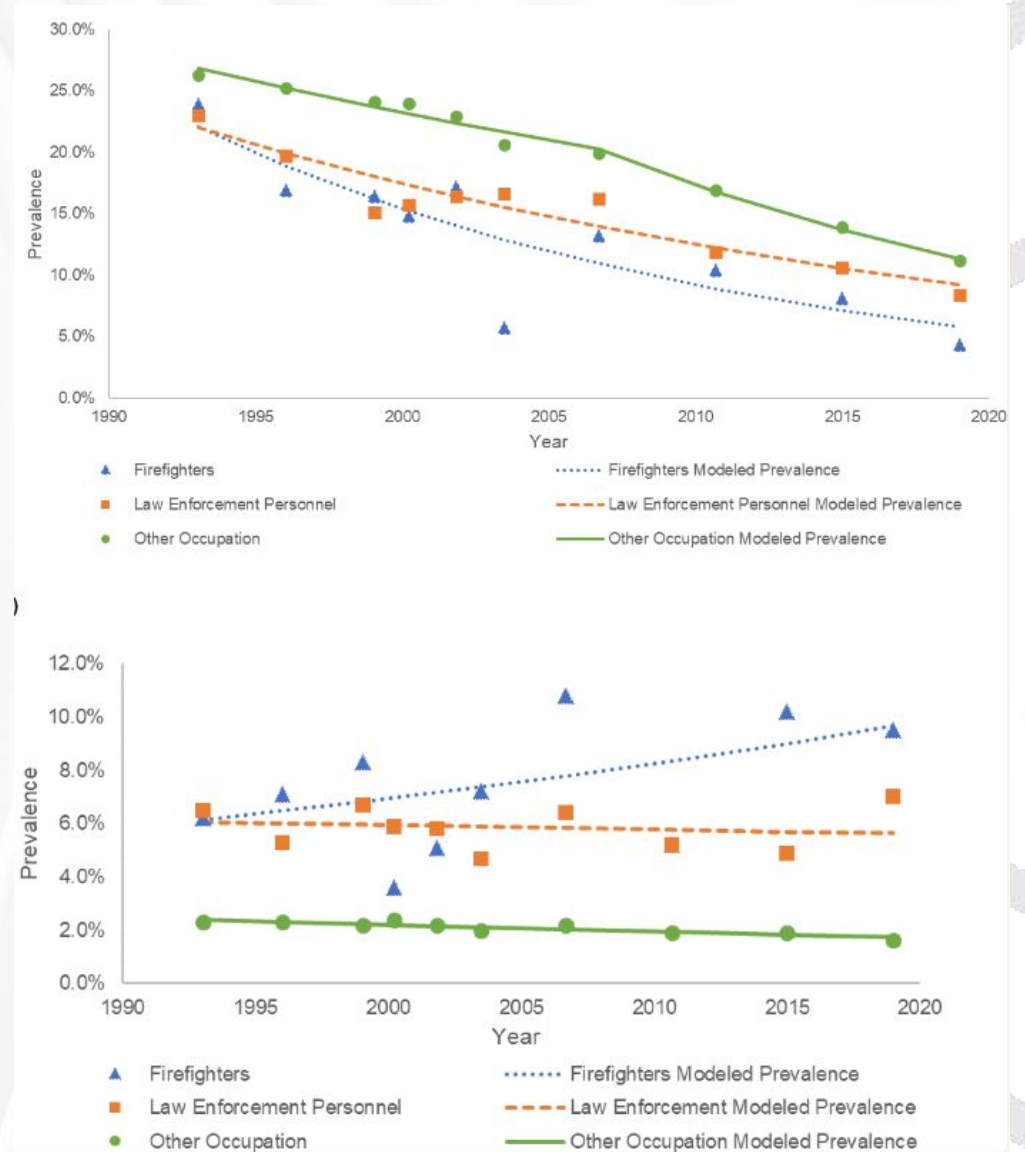
Routine alcohol may ↑ CVD risk <sup>20</sup>



PTSD associated with alcohol use <sup>21-23</sup>



Any amount of alcohol ↑ cancer risk <sup>24</sup>



# Stress

- Trauma, salary, schedule
- Organizational stress a 1° factor <sup>25</sup>



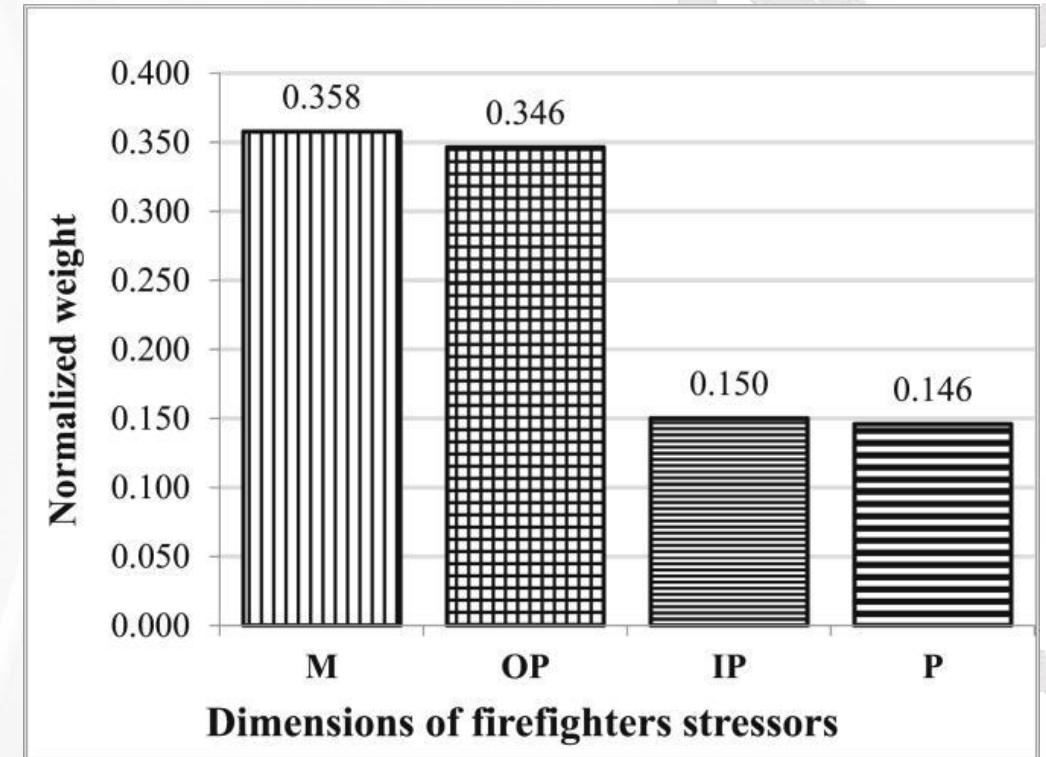
Shift workers 17% ↑ risk of CVD event <sup>26</sup>



Repeated exposure especially harmful <sup>27</sup>



Job strain ↑ risk for certain cancers <sup>28</sup>





# Healthy Relationships

- **Compassion fatigue** <sup>29</sup>
- **Female FF with ↑ divorce** <sup>30</sup>
- **Spouse and FF friends important** <sup>31</sup>



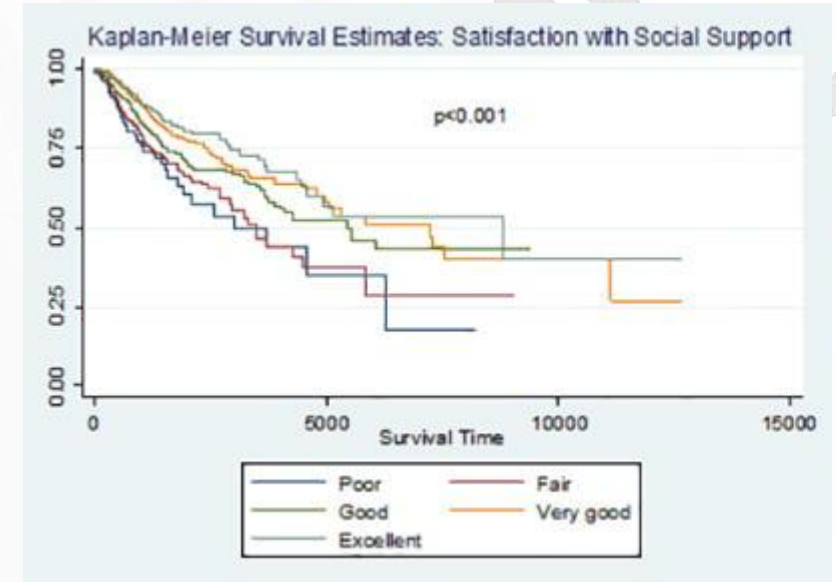
**Perception of social support ↓ CVD risk** <sup>32</sup>



**PTSD associated with relationship dissatisfaction** <sup>33</sup>



**Social support associated with ↓ mortality** <sup>34</sup>



34



# Firefighter Mortality

35

Figure 3. Firefighter Deaths by Cause of Injury: 2022

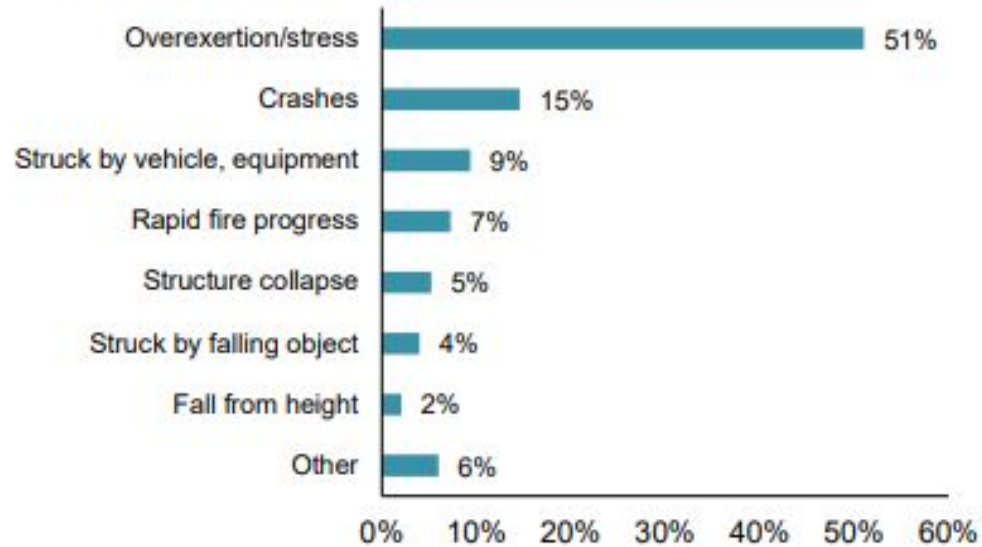
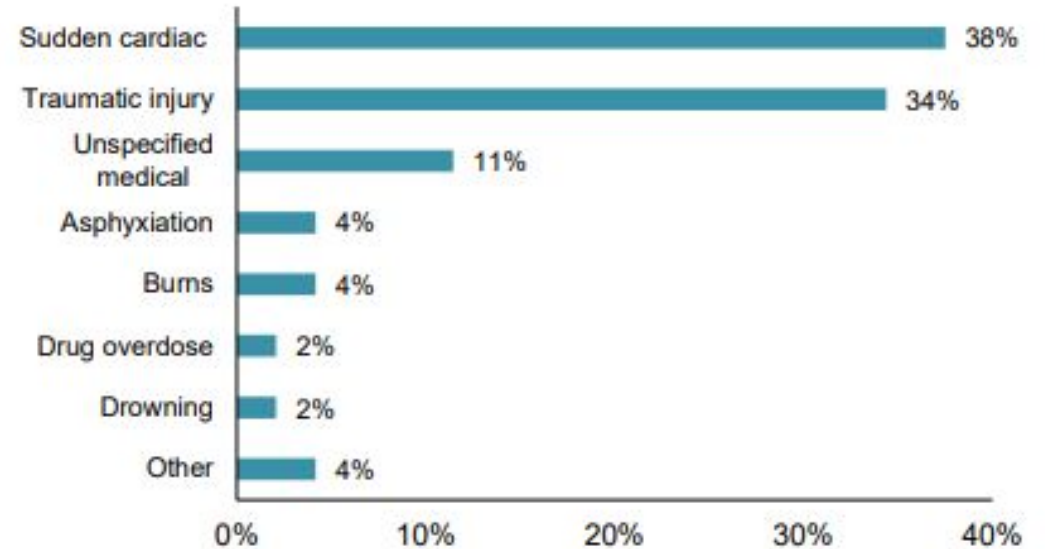


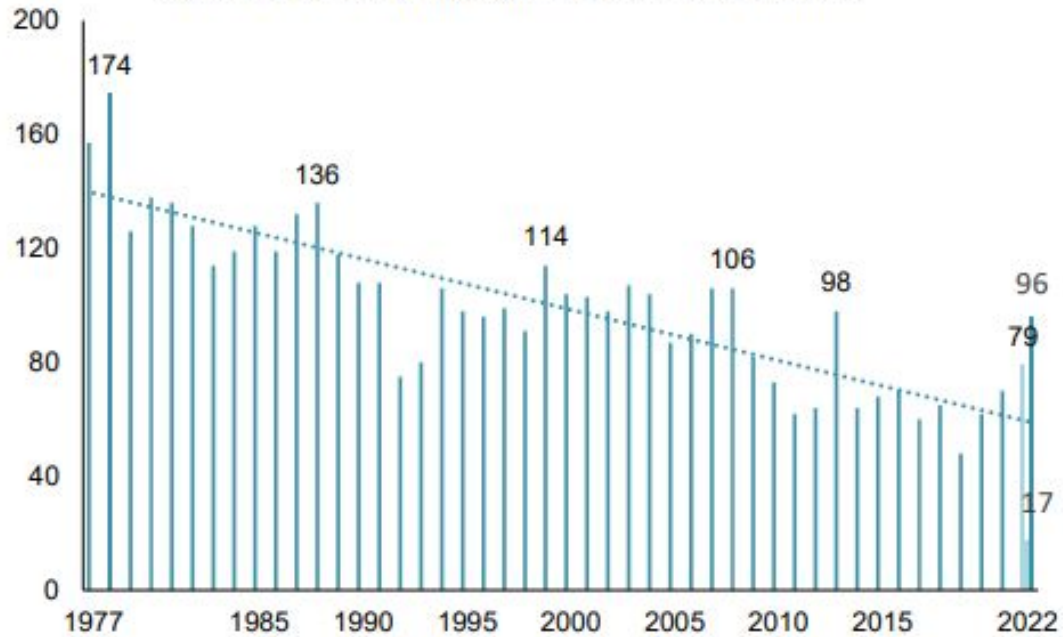
Figure 4. Firefighter Deaths by Nature of Injury: 2022



# Firefighter Mortality

Figure 1. On-Duty Firefighter Deaths: 1977–2022\*

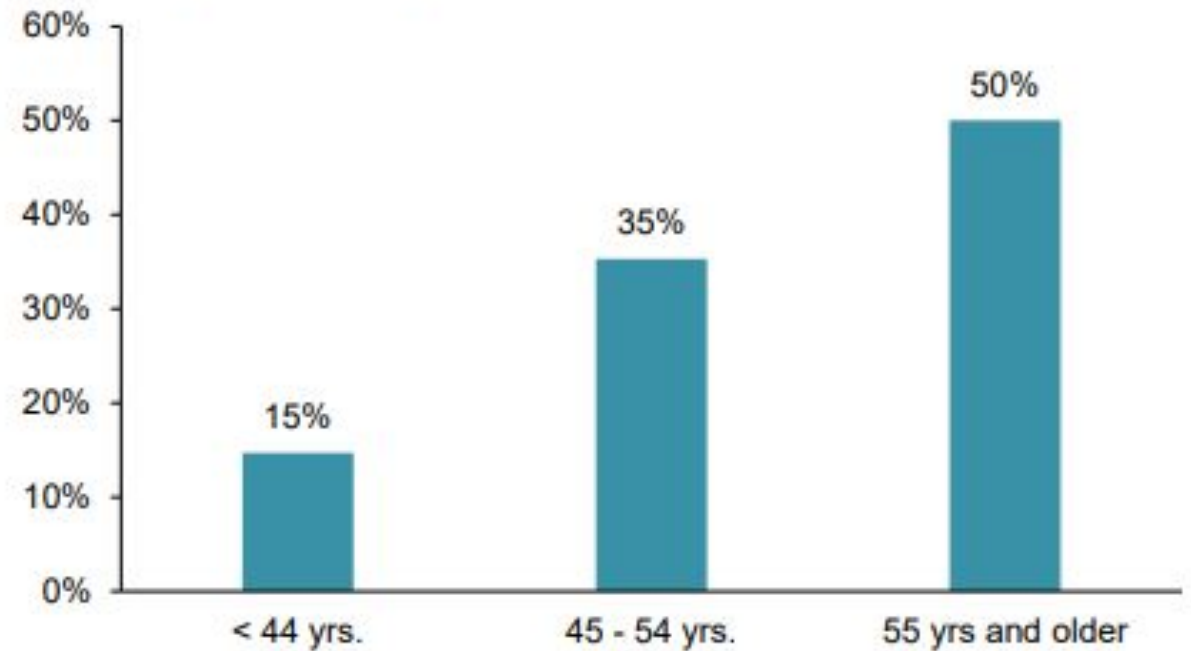
35



\*Does not include the 340 firefighter deaths at the World Trade Center in 2001.

Figure 6. Firefighter Sudden Cardiac Deaths: 2022

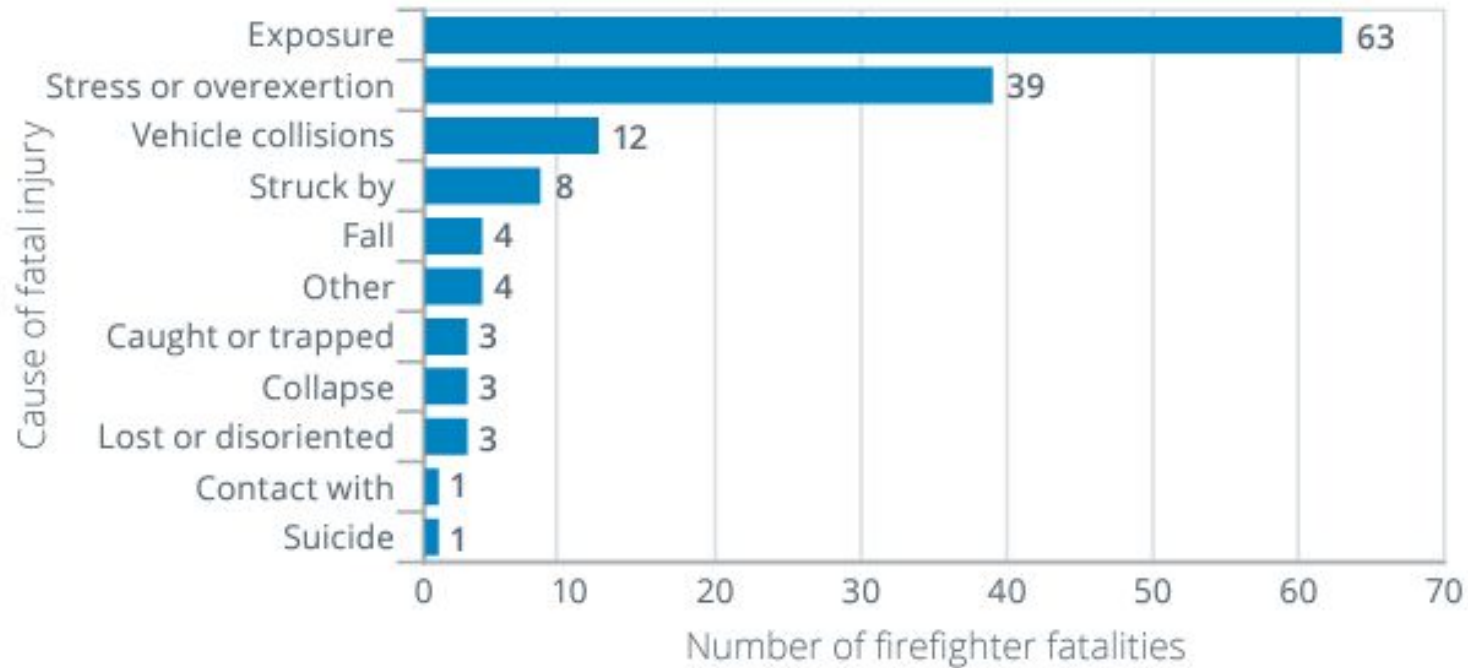
35





# Firefighter Mortality

Figure 7. Firefighter fatalities by cause of fatal injury (2021)



36



# Local Initiatives

- **Ongoing research**
  - vaccines
  - sauna
  - CRF
  - sleep?
  - creatine?
- **Lifestyle Medicine integration**





# References

- Khoshakhlagh, A.H., Sulaie, S.A., Yazdani-rad, S., Orr, R.M., Deharirad, H., and Milajerdi, A. (2023). Global prevalence and associated factors of sleep disorders and poor sleep quality among firefighters: A systematic review and meta-analysis. *Helvion*, 9(2), e13250. DOI: 10.1016/j.helvion.2023.e13250.
- Barger, L.K., Rajaratnam, S.M., Wang, W., O'Brien, C.S., Sullivan, J.P., Qadri, S., Lockley, S.W., and Czeisler, C.A. (2015). Common sleep disorders increase risk for motor vehicle crash and adverse health outcomes in firefighters. *Journal of Clinical Sleep Medicine*, 11(3), 233-240. DOI: 10.5664/jcsm.4534.
- Song, C., Zhang, R., Wang, C., Fu, R., Song, W., Dou, K., and Wang, S. (2021). Sleep quality and risk of cancer: findings from the English longitudinal study of aging. *Sleep*, 44(3), zsa192. DOI: 10.1093/sleep/zsaa192.
- Souza, R.V., Sarmento, R.A., Almeida, J.C., and Canuto, R. (2019). The effect of shift work on eating habits: a systematic review. *Scandinavian Journal of Work, Environment, and Health*, 45(1), 7-21. DOI: 10.5271/sjweh.3759.
- Christodoulou, A., Christophi, C.A., Sotos-Prieto, M., Moffatt, S., and Kales, S.N. (2022). Eating habits among US firefighters and association with cardiometabolic outcomes. *Nutrients*, 14(13), 2762. DOI: 10.2290/nu14132762.
- Yang, J., Farioli, A., Korre, M., and Kales, S.N. (2015). Dietary preferences and nutritional information needs among career firefighters in the United States. *Global Advances in Health and Medicine*, 4(4), 16-23.
- Ventriglio, A., Sancassiani, F., Contu, M.P., Latorre, M., Salvatore, M.D., Fornaro, M., and Bhugra, D. (2020). Mediterranean diet and its benefits on health and mental health: a literature review. *Clinical Practice & Epidemiology in Mental Health*, 16(1), 156-164. DOI: 10.2174/1745017902016010156.
- Parletta, N., Zarnowiecki, D., Cho, J., Wilson, A., Bogomolova, S., Villani, A., Itsiopoulos, C., Nivonsenga, T., Blunden, S., Meyer, B., Segal, L., Baune, B., and O'Dea, K. (2019). A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFI-MED). *Nutritional Neuroscience*, 22(7), 474-487. DOI: 10.1080/1028415x.2017.1411320.
- Jacka, F.N., O'Neill, A., Opie, R., Itsiopoulos, C., Cotton, S., Mohebbi, M., Castle, D., Dash, S., Mihalopoulos, C., Chatterton, M.L., Brazionis, L., Dean, O.M., Hodge, A.M., and Berk, M. (2017). A randomized controlled trial of dietary improvement for adults with major depression (the 'SMILES' trial). *BMC Medicine*, 15, 23. DOI: 10.1186/s12916-017-0791-y.
- Agostinelli, P., Hirschhorn, R., and JoEllen, S. (2023). Exercise habits and resources for Southeastern US firefighters. *Journal of Occupational and Environmental Medicine*, 65(5), e351-e357. DOI: 10.1097/JOM.0000000000002822.
- Soteriades, E.S., Vagazianos, P., Tozzi, F., Antoniadou, E., Economidou, E.C., Psalta, L., and Spanoudis, G. (2022). Exercise and occupational stress among firefighters. *International Journal of Environmental Research and Public Health*, 19(9), 4986. DOI: 10.3390/ijerph19094986.
- Ras, J., Kengne, A.P., Smith, D.L., Soteriades, E.S., and Leach, L. (2023). Association between cardiovascular disease risk factors and cardiorespiratory fitness in firefighters: a systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 20(4), 2816. DOI: 10.3390/ijerph20042816.
- McTiernan, A., Friedenreich, C.M., Katzmarzyk, P.T., Powell, K.E., Macko, R., Buchner, D., Pescatello, L.S., Bloodgood, B., Tennant, B., Vaux-Bjerke, A., George, S.M., Troiano, R.P., and Piercy, K.L. (2019). Physical activity in cancer prevention and survival: a systematic review. *Medicine & Science in Sports & Exercise*, 51(6), 1252-1261. DOI: 10.1249/MSS.0000000000001937.
- Berkowsky, R.S., Zaleski, A.L., Taylor, B.A., Chen, M., Gans, K.M., Wu, Y., Parducci, P.M., Zhang, Y., Fernandez, A.B., and Pescatello, L.S. (2022). Cardiometabolic biomarkers and habitual caffeine consumption associate with the adverse ambulatory blood pressure response to strenuous physical exertion among firefighters. *Nutrients*, 14(19), 4025. DOI: 10.3390/nu14194025.
- Haddock, C.K., Jahnke, S.A., Poston, W.S., Jitnarin, N., Kainust, C.M., Tuley, B., and Hyder, M.L. (2012). Alcohol use among firefighters in the central United States. *Occupational Medicine*, 62(8), 661-664. DOI: 10.1093/occmed/kqs162.
- Haddock, C.K., Poston, W.S., Jahnke, S.A., and Jitnarin, N. (2017). Alcohol use and problem drinking among women firefighters. *Women's Health Issues*, 27(6), 632-638. DOI: 10.1026/j.whi.2017.07.003.
- Carey, M.G., Al-Zaiti, S.S., Dean, G.E., Sessanna, L., and Finnell, D.S. (2011). Sleep problems, depression, substance abuse, social bonding, and quality of life in professional firefighters. *Journal of Occupational & Environmental Medicine*, 53(8), 928-933. DOI: 10.1097/JOM.0b013e318225898f.
- Haddock, C.K., Jitnarin, N., Caetano, R., Jahnke, S.A., Hollerbach, B.S., Kainust, C.M., and Poston, W.S. (2022). Norms about alcohol use among US firefighters. *Safety & Health at Work*, 13(4), 387-393. DOI: 10.1026/j.shaw.2022.08.008.
- Phan, L., McNeel, T.S., Jewett, B., Moose, K., and Choi, K. (2021). Trends of cigarette smoking and smokeless tobacco use among US firefighters and law enforcement personnel, 1992-2019. *American Journal of Industrial Medicine*, 65(1), 72-77. DOI: 10.1002/ajim.23311.
- Biddinger, K.J., Fendin, C.A., Haas, M.E., Wang, M., Hindy, G., Ellinor, P.T., Kathiresan, S., Khera, A.V., and Aragam, K.G. (2022). Association of habitual alcohol intake with risk of cardiovascular disease. *JAMA*, 5(3), e223849.
- Lebault, A., Tran, J.K., and Vujanovic, A.A. (2020). Posttraumatic stress, alcohol use severity, and alcohol use motives among firefighters: the role of anxiety sensitivity. *Addictive Behaviors*, 106, 106353. DOI: 10.1016/j.addbeh.2020.106353.
- Milosavljevic, K., Leonard, S.J., Wardle, M.C., and Vujanovic, A.A. (2023). Alcohol use severity, anger and drinking motives among firefighters. *Substance Use & Misuse*, 58(5), 601-609. DOI: 10.1080/10826084.2023.2177133.
- Zegel, M., Tran, J.K., and Vujanovic, A.A. (2019). Posttraumatic stress, alcohol use, and alcohol use motives among firefighters: the role of distress tolerance. *Psychiatry Research*, 282, 122633. DOI: 10.1016/j.psychres.2019.122633.
- Yoo, J.E., Han, K., Shin, D.W., Kim, D., Kim, B., Chun, S., Jeon, K.H., Jung, W., Park, J., Park, J.H., Choi, K.S., and Kim, J.S. (2022). Association between changes in alcohol consumption and cancer risk. *JAMA*, 5(8), e2228544. DOI: 10.1001/jamanetworkopen.2022.28544.
- Rajabi, F., Molaeifar, H., Jahangiri, M., Taheri, S., Banages, S., and Farhadi, P. (2020). Occupational stressors among firefighters: application of multi-criteria decision making (MCDM) techniques. *Helvion*, 6(4), e03820. DOI: 10.1026/i.helvion.2020.e03820.
- Torquati, L., Mielke, G.I., Brown, W.J., and Kolbe-Alexander, T. (2018). Shift work and the risk of cardiovascular disease. A systematic review and meta-analysis including dose-response relationship. *Scandinavian Journal of Work, Environment & Health*, 44(3), 229-238. DOI: 10.5271/sjweh.3700.
- Harvey, S.B., Milligan-Saville, J.S., Paterson, H.M., Harkness, E.L., Marsh, A.M., Dobson, M., Kemp, R., and Bryant, R.A. (2016). The mental health of firefighters: an examination of the impact on repeated trauma exposure. *The Australian and New Zealand Journal of Psychiatry*, 50(7), 649-658. DOI: 10.1177/000486715615217.
- Yang, T., Qiao, Y., Xiang, S., Li, W., Gan, Y., and Chen, Y. (2018). Work stress and the risk of cancer: a meta-analysis of observational studies. *Cancer Epidemiology*, 144(10) 2390-2400. DOI: 10.1002/ijc.31955.
- Watkins, S.L., Shannon, M.A., Hurtado, D.A., Shea, S.A., and Bowles, N.P. (2021). Interactions between home, work, and sleep among firefighters. *American Journal of Industrial Medicine*, 64(2), 137-148. DOI: 10.1002/ajim.23194.
- Haddock, C.K., Jahnke, S.A., Poston, W.S., Jitnarin, N., and Day, R.S. (2016). Marriage and divorce among firefighters in the United States. *Journal of Family Issues*, 37(16). DOI: 10.1177/0192513X15583070.
- Morman, M.T., Schrodt, P., and Adamson, A. (2019). Firefighters' job stress and the (un)intended consequences of relational quality with spouses and firefighter friends. *International Association for Relationship Research*, 37(4). DOI: 10.1177/0265407519886355.
- Havranek, E.P., Mujahid, M.S., Barr, D.A., Blair, I.V., Cohen, M.S., Cruz-Flores, S., Davey-Smith, G., Dennison-Himmelfarb, C.R., Lauer, M.S., Lockwood, D.W., Rosal, M., and Yancy, C.W. (2015). Social determinants of risk and outcomes for cardiovascular disease. *Circulation*, 132(9), 873-898. DOI: 10.1161/CIR.0000000000000228.
- Godfrey, D.A., Zegel, M., Babcock, J.C., and Vujanovic, A.A. (2022). Posttraumatic stress disorder and relationship satisfaction among firefighters: the role of emotion regulation difficulties. *Journal of Aggression, Maltreatment, & Trauma*, 31(3), 356-369. DOI: 10.1080/10926771.2022.2043973.
- Boen, C., Barrow, D., Bensen, J.T., Farnan, L., Gerstel, A., Hendrix, L., and Yang, Y.C. (2018). Social relationships, inflammation, and cancer survival. *Cancer Epidemiology, Biomarkers, & Prevention*, 27(5), 541-549. DOI: 10.1158/1055-9965.EPI-17-0836.
- Campbell, R., and Petrillo, J.T. (2023, June). *Fatal Firefighter Injuries in the US in 2022*. National Fire Protection Association. <https://www.nfpa.org/-/media/files/news-and-research/fire-statistics-and-reports/emergency-responders/osff.pdf>.
- U.S. Fire Administration. (2023, July). *Firefighter Fatalities in the United States in 2021*. FEMA. <https://www.usfa.fema.gov/downloads/pdf/publications/firefighter-fatalities-2021.pdf>.