PYSCHOSOCIAL OCCUPATIONAL RISK FACTORS FOR OBESITY IN MALE FIREFIGHTERS:
RESULTS OF A WEB-BASED SURVEY

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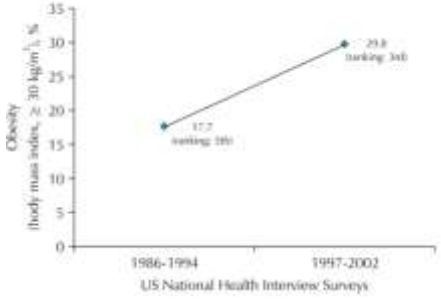
Obesity among firefighters in the United States

- Obesity is a well-known health risk factor for premature mortality and chronic diseases including cardiovascular disease.
- Firefighters have a high risk of on-duty CVD mortality.
- Firefighters and police officers have the third highest prevalence rate of obesity among 41 male occupational groups in the United States (US)



Obesity prevalences of firefighters and police officers in the 1986-1994 and 1997-2002 National Health Interview Surveys of the United States (US). Ranking among 41 US male occupational groups. From Choi et al., *Safety and Health at Work* 2011;2:301-12

Objective of this study

- Little is known about **occupational risk factors** for obesity in firefighters.
- This study aims to investigate whether **adverse psychosocial working conditions are associated with obesity among firefighters.**
  - Work load (the number of 24-hr shifts and the number of daily calls)
  - Job control and psychological job demands
  - Organizational culture

Methods: Study Design/population

- **A cross-sectional web survey of firefighters in a Southern California county in 2009**
- 231 firefighters responded to the survey (participation rate, 27.5%) but 28 surveys were incomplete or invalid due to duplication etc.
  - **203 firefighters:** Comparable to a larger sample (n=740) of firefighters from the county in terms of age, gender, race/ethnicity, and rank, although the survey sample was relatively older, had more females, had more non-whites, and had more Battalion Chiefs and less Engineers.

Study subjects (n=144/203)

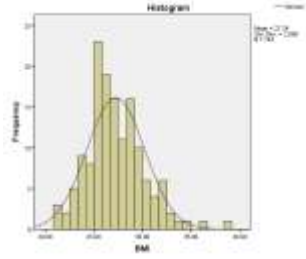
- **Inclusion criteria:**
  - Working at fire authority station
  - Reporting ≥ 9 24-hr shifts in the past month
  - Having valid information on work exposures and BMI
- **Exclusion criteria:**
  - Did not typically work 24-hr shifts
  - Female firefighters (n=7)

Main Exposures:
Psychosocial working conditions

- **The number of calls on a typical work shift**
  - Low call (0-4 calls per day); medium (the reference: 5-7 calls per day); and high (8-15 calls per day)
- **Total 24-hr shifts in the past month**
  - Low (the reference: 9-11 shifts); medium (12-14 shifts); and high (15-17 shits)
- **Job control and psychological job demands**
  - From the Job Content Questionnaire (JCQ): 5 items, alpha = .88 and 3 items, alpha = .59, respectively
- **Organizational culture** (a temporal convenient label)
  - From the pilot 2.0 version of the JCQ: a combination of three subscales of procedural justice (2 items), organizational support (3 items), and macro-level decision latitude (3 items). Alpha = .82

Main outcome – Body Mass Index (BMI: kg/m^2)

- Based on self-reported weight and height



Methods: covariates

- **Socio-demographic** (age, race/ethnicity, marital status, education, and annual household income)
- **Health behaviors** (exercise at work and during leisure-time, sleep time at station, sleep quality at home, emotional eating, and smoking)
- **Multivariate linear regression analysis:** a) in the whole sample and b) in rank-stratified subsamples (firefighters/engineers and captains/battalion chiefs)

Results: Sociodemographic characteristics of the 144 male firefighters

Variables	Subcategories	%
Age, years	21-30	18.1
	31-40	22.9
	41-50	36.1
	51-60	22.9
Race	Whites	81.9
Marital status	Married or living with partners	77.8
Education	Some college or less (high school)	56.9
Annual household income	≥ $100, 000	81.2
Rank	Rookies/Firefighters/Engineers	62.5
	Captains/Battalion Chiefs	37.5

Results: Self-reported BMIs of the 144 male firefighters

Variables	Subcategories	
BMIs	Mean (Standard deviation)	27.24 (2.97)
Normal weight	20 to 24.99 kg/m^2	18.2 %
Overweight	25.00 to 29.99 kg/m^2	66.4%
Obesity	≥30 kg/m^2	15.4%

The multivariate associations of psychosocial working conditions with BMIs in the whole sample

Variables	Subcategory	Model I Beta	Model II[a] Beta	Model III[b] Beta
The number of daily calls	0-4/d	0.12	0.10	0.04
	5-7 /d	Reference	Reference	Reference
	8-15/d	0.03	0.08	0.20**
The number of 24-hr shifts in the past month	9-11/m	Reference	Reference	Reference
	12-14/m	-0.04	-0.01	-0.02
	15-17/m	-0.08	-0.08	-0.15
Low job control		0.01	0.01	0.04
High psychological job demands		0.09	0.04	0.01
Poor organizational culture		0.14	0.13	0.09
R square		0.05	0.11	0.22

[a]Model II: Model I + sociodemographic variables (controlled for).
[b]Model III: Model I + sociodemographic variables + health behavior variables (controlled for).
*p < 0.20, ** < 0.10, and *** p < 0.05

The multivariate associations of psychosocial working conditions with BMIs in firefighters/engineers (n=90)

Variables	Subcategory	Model I Beta	Model II[a] Beta	Model III[b] Beta
The number of daily calls	0-4/d	0.05	0.03	-0.03
	5-7 /d	Reference	Reference	Reference
	8-15/d	0.17	0.23***	0.32***
The number of 24-hr shifts in the past month	9-11/m	Reference	Reference	Reference
	12-14/m	0.05	0.03	0.05
	15-17/m	0.00	-0.08	-0.05
Low job control		0.24**	0.08	0.03
High psychological job demands		0.33***	0.32***	0.26***
Poor organizational culture		0.02	0.06	0.06
R square		0.23	0.35	0.43

[a]Model II: Model I + sociodemographic variables (controlled for).
[b]Model III: Model I + sociodemographic variables + health behavior variables (controlled for).
*p < 0.20, ** < 0.10, and *** p < 0.05

The multivariate associations of psychosocial working conditions with BMIs in captains/battalion chiefs(n=54)

Variables	Subcategory	Model I Beta	Model II[a] Beta	Model III[b] Beta
The number of daily calls	0-4/d	0.15	0.22	0.32*
	5-7 /d	Reference	Reference	Reference
	8-15/d	-0.11	-0.13	-0.00
The number of 24-hr shifts in the past month	9-11/m	Reference	Reference	Reference
	12-14/m	0.01	0.02	-0.08
	15-17/m	0.03	0.13	0.04
Low job control		-0.19	-0.11	-0.03
High psychological job demands		-0.25	-0.24	-0.23
Poor organizational culture		0.28	0.28	0.35**
R square		0.14	0.25	0.44

[a]Model II: Model I + sociodemographic variables (controlled for).
[b]Model III: Model I + sociodemographic variables + health behavior variables (controlled for).
*p < 0.20, ** < 0.10, and *** p < 0.05

Conclusions

- **Some adverse psychosocial working conditions were associated with higher BMIs in this sample of firefighters.**
  - The results with obesity (BMIs, ≥ 30 kg/m^2) (not reported here) were very similar to those with BMIs.
  - One possible mechanism: work stressors – chronic strain – "a hypothalamus arousal syndrome" (Björntrop and Rosmond, 1999; *a parallel activation of the HPA axis and the central sympathetic nerve system*) – obesity
- **The occupational risk factors appeared to be rank-specific among firefighters**
  - Firefighters/Engineers – high (8 or more) daily calls and high psychological **job demands**
  - Captains/Battalion Chiefs – poor **organizational culture** (a combination of procedural justice, organizational support, and macro-level decision latitude) and potentially, low daily calls (p =0.18).

Conclusions

- **14-23% of the total variance in the BMI were explained by the psychosocial working conditions in this study.**
  - 8-19% (based on the R square changes) by health behaviors
- **It indicates that a rank-specific approach** may be considered for worksite obesity prevention among firefighters

Conclusions

- **More studies are needed to understand the impact of psychosocial working conditions on obesity among firefighters. For instance,**
  - **FORWARD Study** (Grant # R21OH009911, CDC/NIOSH), Firefighter Obesity Research: Workplace Action to Reduce Disease(http://www.coeh.uci.edu/forward/)
  - A larger sample size (n ≥ 370)
  - Clinically measured obesity measures (BMI, body fat %, and waist circumference)
  - More diverse psychosocial working conditions measured by a firefighter-specific questionnaire.

Acknowledgements

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Welcome questions!
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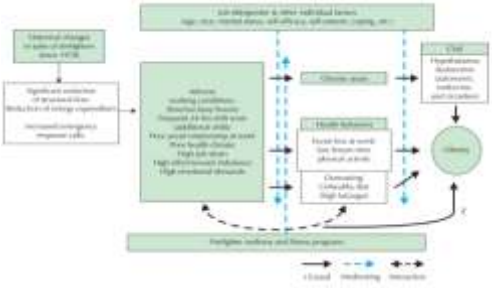

A theoretical framework on working conditions, health behaviors, and obesity in firefighters. CNS: central nerve system. From Choi et al., *Safety and Health at Work* 2011;2:301-12