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*Corresponding author: Marco Tommasi, Department of Medicine and Aging Sciences, University of Chieti-Pescara, Via dei vestini 31, 66100, Chieti, Italy
E-mail: marco.tommasi@unich.it

Reviewing editor:
Gabriella Martino, Department of Clinical and Experimental Medicine, Università Degli Studi Di Messina, ITALY

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WORK, INDUSTRIAL & ORGANIZATIONAL PSYCHOLOGY | RESEARCH ARTICLE

Stress, psychological disease, psychological well-being and personality in Italian firefighters compared to other working categories

Marco Tommasi^{1*}, Marco M. Conte¹ and Aristide Saggino¹

Abstract: This study analyzed the differences between firefighters and other working categories (urban policemen, employees in the service industry) in psychological well-being, anxiety, depression, personality and stress. Much research has evidenced that people who have to deal with emergencies are more subjected to psychological diseases. Our results showed that firefighters have lower levels of anxiety, depression, emotional instability and negative emotions in relation to urban policemen and employees. In addition, there are no significant differences in psychological well-being. Further research is necessary to define the specific psychological attitudes or traits which allow firefighters to deal with psychological disease and stress.

Subjects: Personality; Personality and Identity at Work; Stress and Emotion in the Workplace; Personality Tests & Assessments

Keywords: psychological well-being; anxiety and depression; stress; emergency workers; firefighters

ABOUT THE AUTHOR

Marco Tommasi took his PhD from the University of Padua and actually works at the G. D'Annunzio University of Chieti-Pescara, Italy. He teaches Methodology of Research in Psychology and Theory and Techniques of Psychological Assessment. His research areas include intelligence, personality, psychological well-being, work-related stress, biofeedback, computerized adaptive testing and techniques of multivariate analyses for research.

Marco Maria Conte is actually a collaborator of the psychometrics laboratory of the G. D'Annunzio University of Chieti-Pescara, Italy. He is also a volunteer in the Italian Civil Protection. Aristide Saggino is a full professor at the G. D'Annunzio University of Chieti-Pescara, Italy. He teaches Methodology of Research in Psychology and Theory and Techniques of Psychological Assessment. His research areas include intelligence, personality, evidence-based psychotherapy, work-related stress and psychological well-being. He is president of the AIAMC psychological society, which is a component of the European Association for Behavioural and Cognitive Therapy.

PUBLIC INTEREST STATEMENT

“Stress, psychological disease, psychological well-being and personality in Italian firefighters compared to other working categories”

Firefighters are one of the riskiest workers as they face the dangers of explosions, collapses or fires. It is natural to think that the risks to life and health can lead to a high level of psychological distress, and this is amply demonstrated in the literature. Our study aims to compare the mental health, psychological well-being, stress and even the personality traits of a group of firefighters with other groups of workers (urban police and administrative employees), to evaluate whether there is a greater psychological suffering in firefighters. The data indicates that firefighters have the same level of psychological well-being as other categories, less stress and less risk of mental harm. Some factors are identified and proposed that can affect the greater resilience of firefighters and that can be useful for studying resilience in other types of risky jobs.

1. Introduction

Emergency workers usually experience more job stress than nonemergency workers (Carlier et al., 1997; Fiabane et al., 2012; Jonsson et al., 2003; Mitchell & Dyregrov, 1993; Van Der Ploeg & Kleber, 2003).

Firefighters have to face many dangerous risks during their interventions. They can be injured by fire, they can inhale carbon monoxide, or they could be hit by vehicles or by ruins of wrenching houses. In addition, they have to use dangerous instruments such as saws or clippers, and they can be exposed to inflammable substances which have high probability to explode. The risk of fatalities or casualties is very high for firefighters. In a USA report about the principal cause of deaths in firefighters, 53% of the deaths in firefighters are due to excessive psychological stress or to excessive physical effort (Fahy et al., 2009). The largest number of deaths occurred when firefighters were operating on fires. Even if the number of fatalities in firefighters is relatively small, in comparison with other kinds of emergency workers, however, the percentage of relative risk in workplace is three times greater for firefighters than for other workers (Clark & Zak, 1999).

Many firefighters suffer from heart attacks as a consequence of their interventions in dangerous situations. The risk of having a heart attack is related to age: older firefighters have a greater probability of suffering a heart attack (Fahy et al., 2009). Some studies confirm that firefighters have a greater probability of mortality after a heart attack than other working categories (Noh et al., 2020; Sardinias et al., 1986). Other studies show that firefighters have a greater incidence of medical diseases and a higher probability of developing posttraumatic stress syndrome (Han et al., 2018), having alcohol problems and suicide risk (Bartlett et al., 2018; Bing-Canar et al., 2019; Stanley et al., 2018) or having mental health problems (Chen et al., 2020). In addition, a high percentage of firefighters suffers from mental diseases and risk of developing sleep disorders (Vargas de Barros et al., 2013).

Firefighters have to cope with the stress associated with their work (Brown et al., 2002; Schaefer Solle et al., 2018) and they are subjected to a high risk of developing posttraumatic stress disease (Corneil et al., 1999; Haslam & Mallon, 2003). Stress generated by traumatic events can cause a heart attack. Some studies evidenced that after a natural disease, such as the Athens earthquake of 1981 and Japan tsunami of 2011, the incidence of myocardial infarction in people who suffered losses and damages increased significantly (Nakamura et al., 2017; Trichopoulos et al., 1983). Cells react to stressors through a genetic mechanism by which catecholamines are released, generating myocardial ischemia. By blocking catecholamine receptors it is possible to reduce the emotional stress-induced molecular changes in the heart (Ueyama et al., 2003). Therefore, people suffering from high stress levels, due to traumatic events, are really subjected to the risk of heart attack.

Firefighters intervene when there are emergencies which can cause a lot of casualties among civilians. In relation to the importance of firefighters' work, it is necessary to estimate if firefighters have a greater risk than other working categories in being victims of stress, anxiety and depression and if they have a lower quality of life or a lower level of mental health.

Anxiety and depression can have an important effect on physical health. People with high levels of anxiety and depression have a higher probability of developing hypertension, heart disease, gastrointestinal disease or migraine (El-Gabalawy et al., 2011; Jonas et al., 1997). High levels of anxiety have negative effects on social functioning, mental health, vitality and in working performance (Kroenke et al., 2013; Poursadeghiyan et al., 2016). People with high levels of anxiety and depression tend to suffer from medical problems (Bardone et al., 1998), to suffer from sleep disorders (Augner, 2011), to develop smoking or alcohol dependence or abuse (Grant et al., 2004; Patton et al., 1998) or cognitive failures (Abbasi, Zakerian,

Mehri et al., 2017). Some studies have shown that vulnerability to anxiety is a dangerous factor that can increase suicide risk in firefighters (Stanley et al., 2017) and that anxiety sensitivity and emotional dysregulation can increase the probability of developing posttraumatic stress, depression and social anxiety in firefighters (Paulus et al., 2018). Therefore, it is important to know the level of anxiety and depression in firefighters to help them to develop coping strategies against stress suffered at work (O'Rourke, 2016).

Quality of life is connected to Psychological Well-Being (PWB). Some researchers showed that positive affect (e.g. emotional well-being, positive mood, joy, happiness, vigor, energy) and positive trait-like dispositions (e.g. life satisfaction, hopefulness, optimism, sense of humor) were associated with reduced mortality in healthy populations and with reduced death rates in patients with renal diseases and with HIV infection (Chida & Steptoe, 2008). The PWB improvement in individuals also has positive effects on mental health (Ryff & Keyes, 1995) and in social and family relations (Tommasi et al., 2018). Therefore, an increment of happiness and well-being in the population can give benefits to people by reducing the risk of psychological and psychiatric dysfunctions (Cloninger, 2006; Smith et al., 2019). As far as we know, there were no psychological studies about PWB in Italian firefighters except for one but limited to the use of mindfulness to reduce post-traumatic stress in firefighters (Setti & Argentero, 2014).

On the basis of these empirical data, we decided to collect data about the level of stress, anxiety, depression, PWB and mental health in a sample of Italian firefighters. According to the 2016 Annual Statistics Report of Italian Firefighters, in 2015, the number of firefighter interventions and rescues was 813,678 performed by different Italian firefighter units that globally constitute a total number of 25,658 firefighters. The number of interventions has been constantly increasing since 2006 (Corpo Nazionale dei Vigili del Fuoco [Italian Unit of Firefighters], 2016). The most frequent causes of firefighters interventions are fire or explosions (29%), opening of doors or windows of houses (17%), rescues of people that are in dangerous situations (8%), wrecking or collapsing buildings (6%) and car accidents (5%). It is possible to hypothesize that Italian firefighters can suffer more from mental health problems and psychological dysfunctions than other working categories who do not deal with emergencies. To test this hypothesis we decided to compare the measures of PWB, stress, and mental health in firefighters to those collected from individuals of other working categories. The working categories selected for this comparison were people working in urban police (urban policemen) or people working as office employees in service industry (e.g., banks or schools). In Italy urban policemen, differently from other countries, have principally the task to control urban traffic and to sanction drivers who violate traffic laws. An urban policeman can intervene when there are car accidents with injured or dead people, but the most difficult rescuing operations are made by firefighters. Therefore, urban policemen often have to make urgent interventions, but their level of risk is much more lower than that of firefighters. People working in service industries, instead, make a job for which the level of physical risk is practically zero (about 1.6% according to Istituto Italiano di Statistica (ISTAT) [Italian Institute of Statistics], 2014). Therefore, we compared firefighters scores obtained in psychological tests to those obtained by urban policemen and employees who are engaged in lower risk activities.

2. Method

Subjects. Firefighters were recruited to the firefighter unit of Chieti (Provincial Headquarters of Firefighters of Chieti) which is a town in the central part of Italy. The unit was composed of a total of 28 elements. Other firefighter units in proximal provinces were contacted, but they gave no permission to collect data. Two other worker groups were created to compare the scores of firefighter units with them. The inclusion criterion consisted in creating a group of workers who can be forced to face risky situations, but not as serious as those of the firefighters, and a group of workers who have to carry out non-hazardous work duties. In the first case, we have selected a group of 28 urban policemen who may face risk situations, such as road accidents, but who do not have to face dangerous situations for their physical health, such as fires or building collapses; in the second case, we have selected a group of 28

employees assigned to administrative tasks, who only have to carry out office work. The urban policemen were recruited in the Municipal Police Corps of Chieti, while employees were recruited in different workplaces near the towns of Chieti and Pescara. The employees who worked in administrative offices of public or private institutions were 57.1%; 7.2% worked as bank employees; 7.1% worked as office managers; 28.6% worked in private offices or schools. We asked and obtained permission to collect data from the person in charge of each workplace. Each participant signed an informed consent document for the privacy of their data and was informed about the aim of the research. We followed the Helsinki Declaration rules for ethics in human research.

Materials. Participants were administered self-report questionnaires to measure different PWB, mental health, anxiety, depression and stress. The questionnaires were given to participants by one of the authors of the present work.

Measures of PWB: to measure PWB we used the Revised Life Orientation Test (LOT-R, Scheier et al., 1994), the Life Satisfaction scale (LS, Diener et al., 1985), the Rosenberg's Self-Esteem scale (RSE, Rosenberg, 1965), and the Positive Affect-Negative Affect Scale (PANAS, Watson et al., 1988). LOT-R is a 10-item scale with Likert scoring (5 points) which measures the level of optimism. People with high scores on this scale have a high level of optimism. LS is a five-item scale with Likert scoring (7 points) which measures the level of life satisfaction of individuals. RSE is a 10-item scale with Likert scoring (5 points) which measures the level of self-esteem of individuals. The higher the score, the higher the level of self-esteem. PANAS is a 20-item scale with Likert scoring (5 points) which measures if in the individual there is a prevalence of positive or negative emotions. Items indicate different kinds of emotions or sentiments: 10 are positive and 10 are negative. Therefore, we indicate with PANAS(+) the individual score in positive emotions and with PANAS(-) the individual score in negative emotions.

Measures of mental health: we used the Brief Symptoms Inventory (BSI, Derogatis, 1992) to measure the presence and severity of psychological diseases. BSI is a 53-item scale with Likert scoring (5 points) which measure nine different psychological syndromes: Somatization (BSI-SO), Obsession-Compulsion (BSI-O-C), Interpersonal Sensitivity (BSI-I-S), Depression (BSI-DE), Anxiety (BSI-ANX), Hostility (BSI-HOS), Phobic Anxiety (BSI-PHO), Paranoid Ideation (BSI-PAR) and Psychoticism (BSI-PSY). In addition, it is possible to calculate the Global Severity Index (GSI) which measures the global level of psychological dysfunction. Four items are not grouped in any of the previous factors and measure-specific diseases, such as sleep disorder, eating disorder or persistent death ideas. We also used the Beck Anxiety Inventory questionnaire (BAI, Beck et al., 1988) which measures the psychosomatic symptoms of anxiety. BAI is a 21-item scale with Likert scoring (4 points). The higher the score, the higher the level of psychosomatic anxiety.

Measures of stress: we used the Measure of Psychological Stress scale (MSP, Di Nuovo et al., 2000) which is a scale derived from Tessier's Measure du Stress Psychologique. MSP is a 49-item scale with Likert scoring (4 points). The global score indicates the level of stress (higher the score, higher the level of stress). In addition, the MSP includes six subscales, which are: loose of control and irritability (MSP-irr), psychophysiological sensations connected to stress (MSP-psych), fatigue and confusion (MSP-fat), depressive anxiety (MSP-dep), psychosomatic sensations (MSP-sens) and pains and hyperactivity (MSP-hyper).

Measures of personality: we used the Big Five Questionnaire-Short Form (BFQ-SF, Caprara et al., 1993) which measures the five factors of personality: Extraversion (BFQ-SF-E), Agreeableness (BFQ-SF-A), Conscientiousness (BFQ-SF-C), Emotional Stability (BFQ-SF-ES) and Openness (BFQ-SF-O). BFQ-SF is a 60-item scale with Likert scoring (5 points). Each subscale consists of 12 items.

Measures of social desirability: we used the Marlowe-Crowne scale for Social Desirability-Short Form (MC-SD-SF, Manganelli Rattazzi et al., 2000). The MC-SD-SF is a nine-item scale with

dichotomous scoring (true or false). The higher the score on this scale, the higher the level of social desirability in individuals. To test if there is a possible component of social desirability in individual scores, we estimated correlations between the MC-SD-SF score and those of other scales. Workers are affected by social desirability when asked to evaluate their psychological characteristics or states, such as level of stress, anxiety or depression (Saggino et al., 2015). A significant positive correlation between Marlow-Crowne's scores and the psychological attribute indicates a tendency to overestimate the attribute; a significant negative correlation indicates the tendency to underestimate the attribute.

Procedure. Participants were administered a paper-and-pencil questionnaire with all the psychological scales during rest time in their workplaces. Even if it was a self-report questionnaire, its administration was supervised by an expert examiner. The participants took about 15–20 minutes to compile the questionnaire. All questionnaires were self-report questionnaires; therefore, participants could compile them with complete autonomy. Response rate was 100% because all the contacted participants compiled the questionnaires.

Statistical analysis. To test the effect of works subjected to higher or lower level of risk, we compared the means of PWB, mental health, stress and personality of the three groups of workers (firefighters, urban policemen, and employees) with MANOVAs and one-way ANOVAs to test if there were significant differences between groups. In particular, we expected lower psychological well-being and higher psychological dysfunctions in firefighters in comparison to other categories of workers. In addition, we executed additional statistical analyses to test if statistical differences were due to exogenous factors, not included in the hypothesis.

3. Results

Table 1 shows the demographic characteristics such as gender, education level and marital status of the three groups of workers, firefighters, urban policemen and employees. Urban policemen and employees have a higher educational level, probably because to become a policeman or an employee it is necessary at least a high school degree to pass an exam or competition, while for firefighters it is sufficient a secondary school degree, in Italy. Means and standard deviations of age and years of service are also reported.

Table 2 shows the descriptive statistics of the collected measures for each group of workers. Descriptives are mean, standard deviation, skewness and kurtosis.

We estimated the correlation between the Marlowe-Crowne's scale scores and the responses obtained in the questionnaires. Results are presented in **Table 3**.

Table 3 shows that firefighters' and employees' scores tend to be affected by social desirability, in particular, when they have to estimate level of stress (MSP), psychological syndromes (BSI) and personality traits (BFQ). Both firefighters and employees tend to underestimate their psychological dysfunctions, such as anxiety and depression, while firefighters tend to underestimate their level of stress and to overestimate personality traits such as agreeableness, consciousness, emotional stability and openness. Correlations between Marlowe-Crowne's scores and test scores vary from $-.61$ to $.56$. Therefore, the component of social desirability in subjective responses is not very high. The p values were adjusted for multiple comparisons (Benjamini & Hochberg, 1995).

According to Cramer and Bock (1966), a MANOVA was first performed on the variable means to help protect against inflating the Type 1 error rate in follow-up ANOVAs and post-hoc comparisons. However, prior to conducting the MANOVA, a series of Pearson correlations were performed between all the dependent variables in order to test the MANOVA assumption that the dependent variables

Table 1. Demographic characteristics of the firefighters, urban policemen and employees. Values in parentheses are standard deviations. n.r. means “not reported” datum

	Firefighters	Urban Policemen	Employees
gender			
males	92.9%	57.1%	46.4%
females	7.1%	42.9%	53.6%
age	44.78 (7.71)	46.14 (8.96)	38.71 (8.75)
years of service	18.96 (7.85)	19.21 (10.12)	8.52 (6.28)
education level			
secondary school	14.3%	0.0%	0.0%
high school	67.9%	60.7%	39.3%
university degree	14.3%	39.3%	60.7%
n.r.	3.6%	0.0%	0.0%
marital status			
single	7.1%	28.60%	50.0%
married	75.0%	64.30%	42.9%
divorced	14.3%	7.10%	7.1%
widowed	0.0%	0.0%	0.0%
n.r.	3.6%	0.0%	0.0%

would be correlated with each other in the moderate range (i.e., .20—.60; Meyers et al., 2006). On the basis of the correlations between variables, four MANOVAs were conducted. The first MANOVA included, as dependent variables, the PWB measures LOT-R, LS, RSE, PANAS(-) and PANAS(+), with correlations that ranged from .22 to .64; the second MANOVA included the measures of mental health, BSI-SO, BSI-O-C, BSI-I-S, BSI-DE, BSI-ANX, BSI-HOS, BSI-PHO, BSI-PAR, BSI-PSY, and BAI, with correlations that ranged from .44 to .80; the third MANOVA included the measures of stress MSP-irr, MSP-psych, MSP-fat, MSP-dep, MSP-sens and MSP-hyper, with correlations that ranged from .33 to .76; the fourth MANOVA included the measures of personality BFQ-SF-E, BFQ-SF-A, BFQ-SF-C, BFQ-SF-ES and BFQ-SF-O, with correlations that ranged from .16 to .56.

A statistically no-significant MANOVA effect was obtained for the PWB measures, Pillai's Trace = .17, $F(10, 156) = 1.41$, $p = .18$. A statistically significant MANOVA effect was obtained for the measures of mental health, Pillai's Trace = .63, $F(22, 144) = 3.01$, $p < .001$. A statistically significant MANOVA effect was obtained for the measures of stress, Pillai's Trace = .27, $F(12, 154) = 2.01$, $p < .05$. A statistically significant MANOVA effect was obtained for the measures of personality, Pillai's Trace = .35, $F(10, 156) = 3.31$, $p < .001$.

A series of one-way ANOVAs on each of the dependent variables was conducted as follow-up tests to the MANOVA. An examination of the standard deviations (see Table 2) revealed that none of the largest standard deviations were more than four times the size of the corresponding smallest, suggesting that the ANOVA would be robust in this case (Howell, 2007). As can be seen in Table 4, for measures of mental health, only BSI-O-C, BSI-DE, BSI-ANX and BAI were significant, with effect sizes (η^2) ranging from .073 (BSI-DE) to .154 (BSI-ANX). For measures of stress, all the variables were significant except for MSP-irr, with effect sizes (η^2) ranging from .084 (MSP-psych) to .168 (MSP-hyper). For measures of personality, only BFQ-SF-ES is significant with an effect size (η^2) of .11.

Table 2. Descriptive statistics (mean, standard deviation, skewness and kurtosis) for each psychological questionnaire and relative subscales. s.d. is the standard deviation

measures	Firefighters				Urban Policemen				Employees			
	mean	s.d.	skewness	kurtosis	mean	s.d.	skewness	kurtosis	mean	s.d.	skewness	kurtosis
measures of PWB												
LOT-R	21.14	3.26	0.21	-0.87	20.68	3.46	0.51	-0.32	20.29	3.90	-0.50	-0.67
LS	24.57	6.21	-0.55	-0.53	23.21	5.73	-0.73	-0.40	24.46	5.65	-0.34	-0.80
RSE	19.90	3.71	-0.19	-0.40	20.21	3.68	0.43	0.36	19.93	4.67	0.32	-0.47
PANAS(+)	36.96	4.83	0.19	0.39	36.01	5.70	-1.11	2.26	37.64	5.56	-0.46	-0.53
PANAS(-)	18.40	5.46	0.50	0.15	17.79	6.35	0.42	-1.21	22.35	6.54	0.42	-0.55
measures of mental health												
BSI-SO	0.25	0.51	2.69	7.14	0.49	0.58	1.62	2.30	0.54	0.57	1.01	-0.09
BSI-O-C	0.45	0.54	0.97	-0.49	0.65	0.44	0.53	0.14	0.83	0.65	0.76	-0.38
BSI-I-S	0.43	0.64	1.80	2.42	0.64	0.57	0.83	-0.46	0.69	0.74	1.00	-0.36
BSI-DE	0.32	0.44	1.44	1.15	0.55	0.60	1.38	1.75	0.70	0.63	0.79	-0.56
BSI-ANX	0.32	0.48	1.99	3.56	0.46	0.54	1.77	2.94	0.84	0.54	0.36	-0.83
BSI-HOS	0.44	0.69	1.65	1.38	0.47	0.44	0.96	-0.10	0.66	0.63	0.83	-0.49
BSI-PHO	0.17	0.38	3.04	9.90	0.23	0.36	2.18	5.05	0.19	0.39	2.18	4.28
BSI-PAR	0.56	0.62	1.21	0.46	0.87	0.68	0.52	-1.03	0.77	0.70	0.94	-0.40
BSI-PSY	0.25	0.41	1.77	2.41	0.42	0.55	1.87	3.59	0.47	0.52	0.89	-0.41
BSI-GSI	0.36	0.46	1.78	2.47	0.52	0.46	1.59	2.67	0.63	0.49	0.81	-0.76
BAI	5.04	6.71	2.73	8.27	11.61	11.27	2.16	5.32	14.44	10.93	0.73	-0.76
measures of stress												
MSP-irr	7.64	2.63	1.37	0.87	7.79	2.33	1.30	0.42	8.37	2.57	0.44	-1.07
MSP-psych	4.86	2.01	2.32	4.47	5.29	1.74	1.49	1.29	6.30	2.30	0.69	-1.00

(Continued)

Table 2. (Continued)

measures	Firefighters				Urban Policemen				Employees			
	mean	s.d.	skewness	kurtosis	mean	s.d.	skewness	kurtosis	mean	s.d.	skewness	kurtosis
measures of PWB												
MSP-fat	5.11	1.79	1.41	0.60	5.82	1.87	0.58	-0.93	6.64	2.41	0.48	-0.95
MSP-dep	5.04	1.86	2.23	4.99	5.89	2.62	1.43	1.32	6.87	2.13	0.49	-0.78
MSP-sens	3.93	1.15	1.25	0.93	4.86	1.88	1.26	0.95	5.39	2.10	0.17	-1.44
MSP-hyper	5.00	1.56	0.73	-0.24	5.21	1.26	0.26	-0.66	6.54	1.75	0.02	-0.37
MSP total	71.64	21.27	1.37	0.81	77.43	21.63	1.51	1.58	91.43	22.64	0.19	-1.43
measures of personality												
BFQ-SF-E	38.00	3.06	-0.33	-1.04	39.54	3.96	-0.57	0.02	37.05	6.43	-0.33	-0.02
BFQ-SF-A	41.97	5.26	-0.10	-0.41	40.82	4.21	0.45	-0.41	42.33	5.02	1.06	0.80
BFQ-SF-C	42.11	5.30	0.69	-0.31	44.96	5.45	-1.21	2.05	42.54	5.23	0.26	-0.79
BFQ-SF-ES	43.23	7.20	-0.09	-0.80	39.82	7.46	0.06	-0.99	37.09	7.16	-0.04	-1.25
BFQ-SF-O	40.10	7.36	-0.38	-0.30	40.54	5.87	0.26	-0.64	41.68	8.87	0.08	-0.79
measure of social desirability												
MC-SD-SF	5.98	1.91	0.08	-1.35	5.93	2.14	-0.52	0.15	5.29	1.88	-0.08	-0.15

Notes: PWB: Psychological Well-Being; BSI: Brief Symptoms Inventory with Somatization (BSI-SO), Obsession-Compulsion (BSI-O-C), Interpersonal Sensitivity (BSI-I-S), Depression (BSI-DE), Anxiety (BSI-ANX), Hostility (BSI-HOS), Phobic Anxiety (BSI-PHO), Paranoid Ideation (BSI-PAR), Psychoticism (BSI-PSY) subscale. BSI-GSI: Global Severity Index.

BAI: Beck Anxiety Inventory questionnaire.

MSP: Measure of Psychological Stress scale with loss of control and irritability (MSP-irr), psychophysiological sensation (MSP-psych), fatigue and confusion (MSP-fat), depressive anxiety (MSP-dep), psychosomatic sensations (MSP-sens) and pains and hyperactivity (MSP-hyper) subscale. MSP total: global score at MSP scale.

BFQ-SF: Big Five Questionnaire—Short Form with Extraversion (BFQ-SF-E), Agreeableness (BFQ-SF-A), Conscientiousness (BFQ-SF-C), Emotional Stability (BFQ-SF-ES) and Openness (BFQ-SF-O).

MC-SD-SF: Marlowe-Crowne scale for Social Desirability-Short Form.

Table 3. Correlations between Marlowe-Crowne's scores of social desirability and scores obtained in other psychological tests. Pearson's correlation coefficients (*r*) and relative probabilities (*p(r)*) are reported. Significant probabilities (*p* < .05), corrected for multiple testing, are in bold types

	Firefighters		Urban policemen		Employees	
	<i>r</i>	<i>p(r)</i>	<i>r</i>	<i>p(r)</i>	<i>r</i>	<i>p(r)</i>
measures of PWB						
LOT-R	0.40	0.030	0.15	0.330	0.14	0.257
LS	0.27	0.095	0.41	0.224	0.30	0.088
RSE	0.24	0.113	-0.31	0.261	-0.20	0.187
PANAS(+)	0.08	0.341	0.30	0.261	0.32	0.084
PANAS(-)	-0.56	0.009	-0.28	0.261	-0.28	0.108
measures of mental health						
BSI-SO	-0.37	0.038	-0.19	0.285	-0.26	0.119
BSI-O-C	-0.54	0.014	-0.27	0.261	-0.49	0.028
BSI-I-S	-0.31	0.068	-0.23	0.115	-0.43	0.044
BSI-DE	-0.37	0.038	-0.35	0.261	-0.43	0.044
BSI-ANX	-0.48	0.017	-0.14	0.330	-0.38	0.056
BIS-HOS	-0.44	0.019	-0.28	0.261	-0.42	0.046
BSI-PHO	-0.31	0.068	0.06	0.405	-0.56	0.028
BSI-PAR	-0.45	0.017	-0.21	0.274	-0.39	0.056
BSI-PSY	-0.33	0.057	-0.12	0.330	-0.36	0.060
BSI-GSI	-0.47	0.017	-0.24	0.261	-0.50	0.028
BAI	-0.27	0.095	-0.23	0.261	-0.04	0.415
measures of stress						
MSP-irr	-0.50	0.017	-0.05	0.405	-0.51	0.028
MSP-psych	-0.46	0.017	0.13	0.330	-0.31	0.087
MSP-fat	-0.48	0.017	-0.20	0.285	-0.36	0.060
MSP-dep	-0.37	0.038	-0.11	0.330	-0.23	0.155

(Continued)

Table 3. (Continued)

	Firefighters		Urban policemen		Employees	
	<i>r</i>	<i>p(r)</i>	<i>r</i>	<i>p(r)</i>	<i>r</i>	<i>p(r)</i>
MSP-sens	-0.44	0.019	-0.11	0.330	-0.11	0.292
MSP-hyper	-0.45	0.017	-0.17	0.313	-0.17	0.214
MSP total	-0.61	0.000	-0.12	0.330	-0.39	0.056
measures of personality						
BFQ-SF-E	0.40	0.030	0.24	0.261	0.32	0.084
BFQ-SF-A	0.48	0.017	0.05	0.405	0.45	0.044
BFQ-SF-C	0.26	0.097	0.10	0.334	0.37	0.060
BFQ-SF-ES	0.56	0.009	0.41	0.224	0.34	0.071
BFQ-SF-O	0.46	0.017	0.24	0.261	0.21	0.169

Notes: PWB: Psychological Well-being; LOT-R: Revised Life Orientation Test; LS: Life Satisfaction scale; RSE: Rosenberg's Self-Esteem scale; PANAS(+): Positive Affect Scale; PANAS(-): Negative Affect Scale.

BSI: Brief Symptoms Inventory with Somatization (BSI-SO), Obsession-Compulsion (BSI-O-C), Interpersonal Sensitivity (BSI-I-S), Depression (BSI-DE), Anxiety (BSI-ANX), Hostility (BSI-HOS), Phobic Anxiety (BSI-PHO), Paranoid Ideation (BSI-PAR), Psychoticism (BSI-PSY) subscale. BSI-GSI: Global Severity Index.

BAI: Beck Anxiety Inventory questionnaire.

MSP: Measure of Psychological Stress scale with loss of control and irritability (MSP-irr), psychophysiological sensation (MSP-psych), fatigue and confusion (MSP-fat), depressive anxiety (MSP-dep), psychosomatic sensations (MSP-sens) and pains and hyperactivity (MSP-hyper) subscale. MSP total: global score at MSP scale.

BFQ-SF: Big Five Questionnaire—Short Form with Extraversion (BFQ-SF-E), Agreeableness (BFQ-SF-A), Conscientiousness (BFQ-SF-C), Emotional Stability (BFQ-SF-ES) and Openness (BFQ-SF-O).

Finally, a series of post-hoc analyses (Tukey-HSD) were performed to examine individual mean difference comparisons across all three groups of workers for the measures which obtained significant ANOVAs. The results revealed that not all post-hoc mean comparisons were statistically significant ($p < .05$). The highest number of significant post-hoc comparisons was between firefighters and employees.

Table 4 shows the results of the different ANOVAs and post-hoc comparisons.

Significant differences were found only for the BAI scale, BSI Obsessive-Compulsive subscale, BSI Depression subscale, BSI anxiety subscale, BFQ Emotional Stability subscale, MSP Psychophysiological subscale, MSP Fatigue subscale, MSP Depression and anxiety subscale, MSP Sensibility subscale, MSP Hyperactivity subscale and MSP total score scale. For all the remaining scales differences were not significant. Therefore, significant differences between firefighters, urban policemen and employees were found for depression and anxiety, emotional stability and stress. Firefighters in particular show lower levels of depression, anxiety and stress in relation to urban policemen and, at a greater size, employees.

Because of the unbalanced gender frequencies in firefighters, with a neat prevalence of males, it is possible to hypothesize that significant differences between firefighters and the other working categories are due to the different proportions of genders in each group of workers. Literature shows that depression and anxiety are significantly different between males and females (Marcus et al., 2005; McLean et al., 2011). Therefore, we performed different multiple regression analyses to test if scores on scales which determined significant ANOVAs were affected by the kind of work (Work), by gender (Gender) or by the interaction Work by Gender. We used dummy coding to indicate the different works (1: Firefighters; 2: Urban Policemen; 3: Employees) and genders (0: males; 1: females). The interaction Work by Gender was estimated using the centered values of each single variable.

Table 5 shows the results of the multiple regression analyses. All the regression models show that Gender and Work \times Gender interactions are not significant. Only Work is the valid predictive variable of variance in depression, anxiety, emotional stability and stress scores. Variation inflation factors were 1.266, 1.371 and 1.165 for Work, Gender and Work \times Gender interaction, respectively. Values lower than 10 mean that there is no multicollinearity between predictors (O'Brien, 2007). In addition, we calculated bivariate correlations between the variables of **Table 5** and years of service, to test if there is a relation between measures of mental health stress, personality and years of service. Correlations ranged from $-.29$ (MSP-hyper) to $.16$ (BFS-SF-ES) but were not significant (p values corrected for multiple correlations ranged from $.06$ to $.34$). Therefore, there is no relation between years of service and mental health, stress or personality.

4. Discussion and conclusion

Contrary to other authors (Han et al., 2018; Vargas de Barros et al., 2013), our data does not highlight a negative psychological situation in firefighters in comparison to other working categories. In particular, firefighters show lower levels of anxiety, depression and stress, which are indexes of psychological diseases, even if they have to deal with risky situations or to intervene in emergencies. In addition, they show a higher level of emotional stability. In comparison to other working categories firefighters have the lowest level of psychological disease, while urban policemen have a middle level and employees have the highest level. According to the Italian Institute of Statistics (Istituto Italiano di Statistica (ISTAT) [Italian Institute of Statistics], 2014), 29.3% of employees complain for suffering in their workplace and the principal motivation of their complains is the excessive work load and the organization of working time (Istituto Italiano di Statistica (ISTAT) [Italian Institute of Statistics], 2014). This characteristic is also evidenced by people working in banking institutions (Saggino et al., 2015).

Table 4. ANOVA results (F values and their relative probabilities p(F)) for each psychological scale and relative subscales. Significant probabilities (p < .05) are in bold types. Effect sizes (η^2) are also reported. Post-hoc comparisons (Tukey-HSD tests) are reported only for significant ANOVAs. F-UP: difference between firefighters and urban policemen; UP-E: difference between urban policemen and employees; F-E: difference between firefighters and employees

measures	ANOVAs		Tukey-HSD post-hoc tests						
	F (2, 81)	p(F)	effect size (η^2)	F-UP		UP-E		F-E	
				diff.	p	diff.	p	diff.	p
measures of mental health									
BSI-SO	2.214	0.116	0.052						
BSI-O-C	3.375	0.039	0.077	0.196	0.380	0.186	0.420	0.382	0.030
BSI-I-S	1.269	0.287	0.030						
BSI-DE	3.181	0.047	0.073	0.229	0.285	0.146	0.593	0.375	0.038
BSI-ANX	7.363	0.001	0.154	0.136	0.593	0.379	0.021	0.514	0.001
BIS-HOS	1.177	0.314	0.028						
BSI-PHO	0.165	0.848	0.004						
BSI-PAR	1.543	0.220	0.037						
BSI-PSY	1.516	0.226	0.036						
BSI-GSI	2.406	0.097	0.056						
BAI	6.700	0.002	0.142	6.571	0.039	2.829	0.533	9.400	0.002
measures of stress									
MSP-lir	0.654	0.523	0.016						
MSP-psych	3.702	0.029	0.084	0.429	0.711	1.011	0.157	1.439	0.026
MSP-fat	3.972	0.023	0.089	0.714	0.394	0.821	0.293	1.536	0.017
MSP-dep	4.764	0.011	0.105	0.857	0.324	0.975	0.234	1.832	0.008
MSP-sens	4.980	0.009	0.110	0.929	0.124	0.536	0.492	1.464	0.007
MSP-hyper	8.185	0.001	0.168	0.214	0.861	1.321	0.005	1.536	0.001

(Continued)

Table 4. (Continued)

measures	ANOVAs		Tukey-HSD post-hoc tests						
	F (2, 81)	p(F)	effect size (η^2)	F—UP		UP—E		F—E	
				diff.	p	diff.	p	diff.	p
MSP total	6.065	0.004	0.130	5.786	0.585	13.996	0.049	19.782	0.003
measures of personality									
BFQ-SF-E	1.991	0.143	0.047						
BFQ-SF-A	0.734	0.483	0.018						
BFQ-SF-C	2.338	0.103	0.055						
BFQ-SF-ES	5.010	0.009	0.110	3.411	0.192	2.732	0.343	6.143	0.006
BFQ-SF-O	0.333	0.718	0.008						

Notes: BSI: Brief Symptoms Inventory with Somatization (BSI-SO), Obsession-Compulsion (BSI-O-C), Interpersonal Sensitivity (BSI-I-S), Depression (BSI-DE), Anxiety (BSI-ANX), Hostility (BSI-HOS), Phobic Anxiety (BSI-PHO), Paranoid Ideation (BSI-PAR), Psychoticism (BSI-PSY) subscale. BSI-GSI: Global Severity Index.

BAI: Beck Anxiety Inventory questionnaire.

MSP: Measure of Psychological Stress scale with loss of control and irritability (MSP-irr), psychophysiological sensation (MSP-psych), fatigue and confusion (MSP-fat), depressive anxiety (MSP-dep), psychosomatic sensations (MSP-sens) and pains and hyperactivity (MSP-hyper) subscale. MSP total: global score at MSP scale.

BFQ-SF: Big Five Questionnaire—Short Form with Extraversion (BFQ-SF-E), Agreeableness (BFQ-SF-A), Conscientiousness (BFQ-SF-C), Emotional Stability (BFQ-SF-ES) and Openness (BFQ-SF-O).

Table 5. Multiple regression analyses for the scales which obtained significant ANOVAs. Standardized β coefficients, t values, probabilities $p(t)$ and partial η^2 are reported. The general validity of the regression model is indicated by R^2 , adjusted R^2 , F value and its probability $p(F)$. Significant probability values ($p < .05$) are in bold type

	coefficients table					model general validity				
	stand. β s	t value	$p(t)$	Partial η^2	R^2	adjust. R^2	$F(3,80)$	$p(F)$		
BAI	work	0.297	2.579	0.012	0.077	0.164	0.133	5.233	0.002	
	gender	0.180	1.508	0.136	0.028					
	work x gender	0.014	0.124	0.902	0.000					
BSI-O-C	work	0.287	2.378	0.020	0.066	0.080	0.046	2.332	0.080	
	gender	-0.004	-0.035	0.972	0.000					
	work x gender	0.031	0.265	0.791	0.001					
BSI-DE	work	0.273	2.269	0.026	0.060	0.082	0.048	2.386	0.075	
	gender	0.011	0.091	0.928	0.000					
	work x gender	0.097	0.836	0.405	0.009					
BSI-ANX	work	0.393	3.383	0.001	0.125	0.148	0.117	4.648	0.005	
	gender	-0.017	-0.138	0.891	0.000					
	work x gender	0.076	0.685	0.495	0.006					
BFQ-SF-ES	work	-0.323	-2.734	0.008	0.085	0.116	0.083	3.489	0.019	
	gender	-0.034	-0.278	0.782	0.001					
	work x gender	-0.062	-0.545	0.587	0.004					
MSP-psych	work	0.293	2.448	0.017	0.070	0.095	0.061	2.807	0.045	
	gender	0.004	0.029	0.977	0.000					
	work x gender	0.125	1.087	0.280	0.015					
MSP-fat	work	0.335	2.795	0.006	0.089	0.094	0.060	2.777	0.047	
	gender	-0.076	-0.614	0.541	0.005					
	work x gender	0.056	0.485	0.629	0.003					
MSP-dep	work	0.296	2.525	0.014	0.074	0.129	0.096	3.940	0.011	
	gender	0.095	0.775	0.441	0.007					

(Continued)

Table 5. (Continued)

	coefficients table				model general validity			
	stand. β s	t value	p(t)	Partial η^2	R ²	adjust. R ²	F(3,80)	p(F)
work x gender	0.099	0.879	0.382	0.010				
work	0.344	2.895	0.005	0.095	0.109	0.076	3.268	0.025
gender	-0.029	-0.237	0.813	0.001				
work x gender	0.050	0.441	0.660	0.002				
work	0.387	3.341	0.001	0.122	0.152	0.120	4.769	0.004
gender	0.002	0.013	0.990	0.000				
work x gender	0.092	0.825	0.412	0.008				
work	0.373	3.174	0.002	0.112	0.129	0.097	3.959	0.011
gender	-0.033	-0.273	0.786	0.001				
work x gender	0.084	0.749	0.456	0.007				

Notes: BSI-SO: Brief Symptoms Inventory -Somatization subscale; BSI-DE: Brief Symptoms Inventory- Depression subscale; BSI-ANX: Brief Symptoms Inventory-Anxiety subscale; BAI: Beck Anxiety Inventory questionnaire; BFQ-SF-ES: Big Five Questionnaire—Short Form- Emotional Stability subscale; MSP-psych: Measure of Psychological Stress- psychophysiological sensation subscale; MSP-fat: Measure of Psychological Stress- fatigue and confusion subscale; MSP-dep: Measure of Psychological Stress- depressive anxiety subscale; MSP-sens: Measure of Psychological Stress- psychosomatic sensations subscale; MSP-hyper: Measure of Psychological Stress- pains and hyperactivity subscale; MSP total: global score at MSP scale.

We propose some possible explanations for the lower levels of stress and psychological disease in our sample of firefighters.

The first explanation is that firefighters are trained people that have competencies and abilities in managing dangerous situations. The necessity to follow a training, which requests high physical performance (Del Sal et al., 2009), probably prevent people with higher levels of anxiety or emotional instability from taking part in firefighters corps determining, in this way, a selection of the individuals that have stronger control over their emotions, especially on negative emotions. There is scientific evidence that training and work ability are positively related to psychological well-being (Abbasi, Zakerian, Akbarzade et al., 2017).

The second explanation is firefighters' engagement. Engagement is defined as a positive attitude toward work and a state of mind characterized by vigor, dedication, and absorption (Schaufeli et al., 2002). Individuals with a high level of engagement show high levels of energy and desire to deal with professional problems (vigor), high level of enthusiasm and inspiration in performing their work (dedication) and high level of concentration and attention when working (absorption). Work engagement is related to psychological well-being in workplaces because there is a positive relation between engagement and absence of health complaints (Meyer & Allen, 1997).

The third explanation is social support. As firefighters risk their lives to save other people, they are considered as extremely positive figures by the society. Some researchers have shown that social support can help in reducing the severity of psychological diseases (Daniels & Guppy, 1994; O'Rourke, 2016; Thoits, 1985; Turner, 1981).

The fourth explanation is based on the relation between intrinsic and extrinsic motivation in job satisfaction and psychological disease. Research shows that a stronger intrinsic motivation helps people to reduce their level of stress and anxiety and to improve their job performance and satisfaction (Fransson, 1977; Gottfried, 1982; Lawler & Hall, 1970; Luo, 1999; Stoeber et al., 2009). We did not measure intrinsic motivation in our research, but we are planning to include this variable in future studies on firefighters or on people that have to deal with emergencies such as military, sanitary or civil service corps.

Other researchers proposed optimism as a possible explanation of firefighters' well-being (Setti & Argentero, 2014), but we tend to exclude this possibility because we did not find significant differences in measures of optimism between firefighters and other working categories.

All the proposed explanations (training, work engagement, social support, motivation) were not directly tested in our study, whose main objective was to evaluate the existence of differences in the dimensions of psychological well-being, mental health, stress and personality between firefighters and other workers. However, the evidence of these differences suggests a possible structure of the factors that determine psychological well-being and stress in workers who face dangerous situations.

A limitation of our study is the low number of subjects and the limited geographic extension of our sample. Therefore, there is a risk that our sample is not fully representative of all Italian firefighters, but it is not easy to obtain permissions to study human behavior and psychological traits for workers that are involved in risky and dangerous activities. However, we think that our study can represent an important starting point in studying psychological well-being in Italian firefighters because firefighters have a fundamental role in helping and saving people in modern society. In addition, this kind of research can be extended to other personnel involved in emergency situations and risky tasks, such as military, police and civil personnel.

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Author details

Marco Tommasi¹

E-mail: marco.tommasi@unich.it

Marco M. Conte¹

Aristide Saggino¹

¹ Department of Medicine and Aging Sciences, University of Chieti-Pescara, Chieti, Italy.

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References

- Abbasi, M., Zakerian, A., Akbarzade, A., Dinarvand, N., Ghaljahi, M., Poursadeghiyan, M., & Ebrahimi, M. H. (2017). Investigation of the relationship between work ability and work-related quality of life in nurses. *Iranian Journal of Public Health*, 46(10), 1404–1412. PMID: 29308385
- Abbasi, M., Zakerian, A., Mehri, A., Poursadeghiyan, M., Dinarvand, N., Akbarzadeh, A., & Ebrahimi, M. H. (2017). Investigation into effects of work-related quality of life and some related factors on cognitive failures among nurses. *International Journal of Occupational Safety and Ergonomics*, 23(3), 386–392. <https://doi.org/10.1080/10803548.2016.1216991>
- Augner, C. (2011). Associations of subjective sleep quality with depression score, anxiety, physical symptoms and sleep onset latency in students. *Central European Journal of Public Health*, 19(2), 115. <https://doi.org/10.21101/cejph.a3647>
- Bardone, A. M., Moffitt, T. E., Caspi, A., Dickson, N., Stanton, W. R., & Silva, P. A. (1998). Adult physical health outcomes of adolescent girls with conduct disorder, depression, and anxiety. *Journal of the American Academy of Child & Adolescent Psychiatry*, 37(6), 594–601. <https://doi.org/10.1097/00004583-199806000-00009>
- Bartlett, B. A., Jardin, C., Martin, C., Tran, J. K., Buser, S., Anestis, M. D., & Vujanovic, A. A. (2018). Posttraumatic stress and suicidality among firefighters: The moderating role of distress tolerance. *Cognitive Therapy and Research*, 42(4), 483–496. <https://doi.org/10.1007/s10608-018-9892-y>
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 56(6), 893–897. <https://doi.org/10.1037/0022-006X.56.6.893>
- Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society: Series B (Methodological)*, 57(1), 289–300. <https://doi.org/10.1111/j.2517-6161.1995.tb02031.x>
- Bing-Canar, H., Ranney, R. M., McNett, S., Tran, J. K., Berenz, E. C., & Vujanovic, A. A. (2019). Alcohol use problems, posttraumatic stress disorder, and suicide risk among trauma-exposed firefighters. *The Journal of Nervous and Mental Disease*, 207(3), 192–198. <https://doi.org/10.1097/NMD.0000000000000947>
- Brown, J., Mulhern, G., & Joseph, S. (2002). Incident-related stressors, locus of control, coping and psychological distress among firefighters in Northern Ireland. *Journal of Traumatic Stress*, 15(2), 161–168. <https://doi.org/10.1023/A:1014816309959>
- Caprara, G. V., Barbaranelli, C., Borgogni, L., & Perugini, M. (1993). The “Big Five Questionnaire”: A new questionnaire to assess the five factor model. *Personality and Individual Differences*, 15(3), 281–288. [https://doi.org/10.1016/0191-8869\(93\)90218-R](https://doi.org/10.1016/0191-8869(93)90218-R)
- Carlier, I. V., Lamberts, R. D., & Gersons, B. P. (1997). Risk factors for posttraumatic stress symptomatology in police officers: A prospective analysis. *The Journal of Nervous and Mental Disease*, 185(8), 498–506. <https://doi.org/10.1097/00005053-199708000-00004>
- Chen, X., Zhang, L., Peng, Z., & Chen, S. (2020). Factors Influencing the mental health of firefighters in Shantou City, China. *Psychology Research and Behavior Management*, 13, 529–536. <https://doi.org/10.2147/PRBM.S249650>
- Chida, Y., & Steptoe, A. (2008). Positive psychological well-being and mortality: A quantitative review of prospective observational studies. *Psychosomatic Medicine*, 70(7), 741–756. <https://doi.org/10.1097/PSY.0b013e31818105ba>
- Clark, C., & Zak, M. J. (1999). Fatalities to law enforcement officers and firefighters, 1992–97. *Compensation and Working Conditions*, 15(2), 3–7. <https://www.bls.gov/opub/mlr/cwc/fatalities-to-law-enforcement-officers-and-firefighters-1992-97.pdf>
- Cloninger, C. R. (2006). The science of well-being: An integrated approach to mental health and its disorders. *World Psychiatry*, 5(2), 71–76. PMID: 16946938
- Cornell, W., Beaton, R., Murphy, S., Johnson, C., & Pike, K. (1999). Exposure to traumatic incidents and prevalence of posttraumatic stress symptomatology in urban firefighters in two countries. *Journal of Occupational Health Psychology*, 4(2), 131–141. <https://doi.org/10.1037/1076-8998.4.2.131>
- Corpo Nazionale dei Vigili del Fuoco [Italian Unit of Firefighters]. (2016). *Annuario statistico del corpo nazionale dei vigili del fuoco 2016 [2016 Annual Statistic Report of Italian Firefighters]*. Ministero dell'Interno - Corpo Nazionale dei Vigili del Fuoco. <https://www.vigilfuoco.it>
- Cramer, E. M., & Bock, R. D. (1966). Multivariate analysis. *Review of Educational Research*, 36(5), 604–617. <https://doi.org/10.3102/00346543036005604>
- Daniels, K., & Guppy, A. (1994). Occupational stress, social support, job control, and psychological well-being. *Human Relations*, 47(12), 1523–1544. <https://doi.org/10.1177/001872679404701205>
- Del Sal, M., Barbieri, E., Garbati, P., Sisti, D., Rocchi, M. B., & Stocchi, V. (2009). Physiologic responses of firefighter recruits during a supervised live-fire work performance test. *The Journal of Strength & Conditioning*

- Research*, 23(8), 2396–2404. <https://doi.org/10.1519/JSC.0b013e3181bb72c0>
- Derogatis, L. R. (1992). *The brief symptom inventory (BSI): Administration, scoring & procedures manual-II*. Clinical Psychometric Research.
- Di Nuovo, S., Rispoli, L., & Genta, E. (2000). *Misurare lo stress. Il test MSP e altri strumenti per una valutazione integrata* [Measuring stress. The MSP test and other instruments for an integrated assessment] (Vol. 19). Franco Angeli.
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13
- El-Gabalawy, R., Mackenzie, C. S., Shooshtari, S., & Sareen, J. (2011). Comorbid physical health conditions and anxiety disorders: A population-based exploration of prevalence and health outcomes among older adults. *General Hospital Psychiatry*, 33(6), 556–564. <https://doi.org/10.1016/j.genhosppsych.2011.07.005>
- Fahy, R. F., LeBlanc, P. R., & Molis, J. L. (2009). *Firefighter fatalities in the United States-2008*. National Fire Protection Association. Fire Analysis and Research Division.
- Fiabane, E., Giorgi, I., Musian, D., Sguazzin, C., & Argentero, P. (2012). Occupational stress and job satisfaction of healthcare staff in rehabilitation units. *La Medicina Del Lavoro*, 103(6), 482–492. PMID: 23405482
- Fransson, A. (1977). On qualitative differences in learning: IV—Effects of intrinsic motivation and extrinsic test anxiety on process and outcome. *British Journal of Educational Psychology*, 47(3), 244–257. <https://doi.org/10.1111/j.2044-8279.1977.tb02353.x>
- Gottfried, A. E. (1982). Relationships between academic intrinsic motivation and anxiety in children and young adolescents. *Journal of School Psychology*, 20(3), 205–215. [https://doi.org/10.1016/0022-4405\(82\)90050-4](https://doi.org/10.1016/0022-4405(82)90050-4)
- Grant, B. F., Stinson, F. S., Dawson, D. A., Chou, S. P., Dufour, M. C., Compton, W., Pickering, R. P., & Kaplan, K. (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: Results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry*, 61(8), 807–816. <https://doi.org/10.1001/archpsyc.61.8.807>
- Han, M., Park, S., Park, J. H., Hwang, S. S., & Kim, I. (2018). Do police officers and firefighters have a higher risk of disease than other public officers? A 13-year nationwide cohort study in South Korea. *BMJ Open*, 8(1), e019987. <https://doi.org/10.1136/bmjopen-2017-019987>
- Haslam, C., & Mallon, K. (2003). A preliminary investigation of posttraumatic stress symptoms among firefighters. *Work and Stress*, 17(3), 277–285. <https://doi.org/10.1080/02678370310001625649>
- Howell, D. C. (2007). *Statistical methods for psychology*. Thompson Wadsworth.
- Istituto Italiano di Statistica (ISTAT) [Italian Institute of Statistics]. (2014). *Salute e sicurezza sul lavoro* [Health and security in working places]. Istituto nazionale di statistica. <https://www.istat.it>
- Jonas, B. S., Franks, P., & Ingram, D. D. (1997). Are symptoms of anxiety and depression risk factors for hypertension? Longitudinal evidence from the National Health and Nutrition Examination Survey I Epidemiologic Follow-up Study. *Archives of Family Medicine*, 6(1), 43–49. <https://doi.org/10.1001/archfami.6.1.43>
- Jonsson, A., Segesten, K., & Mattsson, B. (2003). Post-traumatic stress among Swedish ambulance personnel. *Emergency Medicine Journal*, 20(1), 79–84. <https://doi.org/10.1136/emj.20.1.79>
- Kroenke, K., Outcalt, S., Krebs, E., Bair, M. J., Wu, J., Chumbler, N., & Yu, Z. (2013). Association between anxiety, health-related quality of life and functional impairment in primary care patients with chronic pain. *General Hospital Psychiatry*, 35(4), 359–365. <https://doi.org/10.1016/j.genhosppsych.2013.03.020>
- Lawler, E. E., & Hall, D. T. (1970). Relationship of job characteristics to job involvement, satisfaction, and intrinsic motivation. *Journal of Applied Psychology*, 54(4), 305–312. <https://doi.org/10.1037/h0029692>
- Luo, L. (1999). Work motivation, job stress and employees' well-being. *Journal of Applied Management Studies*, 8(1), 61–72. <http://web.ba.ntu.edu.tw/luolu/1999%20Work%20motivation%20job%20stress%20and%20employees%20well%20being.pdf>
- Manganelli Rattazzi, A. M., Canova, L., & Marcorin, R. (2000). La desiderabilità sociale. Un'analisi di forme brevi della scala di Marlowe e Crowne [Social desirability. An analysis of short forms of Marlowe-Crowne's scale]. *Testing, Psicometria, Metodologia*, 7(1), 5–17. <https://www.tpm.org/2000-vol-7-no-1-spring/>
- Marcus, S. M., Young, E. A., Kerber, K. B., Kornstein, S., Farabaugh, A. H., Mitchell, J., Wisniewskif, S. R., Balasubramanif, G. K., Trivedi, M. H., & Rush, A. J. (2005). Gender differences in depression: Findings from the STAR* D study. *Journal of Affective Disorders*, 87(2–3), 141–150. <https://doi.org/10.1016/j.jad.2004.09.008>
- McLean, C. P., Asnaani, A., Litz, B. T., & Hofmann, S. G. (2011). Gender differences in anxiety disorders: Prevalence, course of illness, comorbidity and burden of illness. *Journal of Psychiatric Research*, 45(8), 1027–1035. <https://doi.org/10.1016/j.jpsychires.2011.03.006>
- Meyer, J. P., & Allen, N. J. (1997). *Commitment in the workplace: Theory, research, and application*. Sage.
- Meyers, L. S., Gamst, G., & Guarino, A. (2006). *Applied multivariate research: Design and interpretation*. Sage Publishers.
- Mitchell, J. T., & Dyregrov, A. (1993). Traumatic Stress in disaster workers and emergency personnel. In J. P. Wilson & B. Raphael (Eds.), *International handbook of traumatic stress syndromes. The plenum series on stress and coping*. Springer. pp. 905–914.
- Nakamura, M., Tanaka, K., Tanaka, F., Matsuura, Y., Komi, R., Niyama, M., Kawakami, M., Koeda, Y., Sakai, T., Onoda, T., & Itoh, T. (2017). Long-term effects of the 2011 Japan earthquake and tsunami on incidence of fatal and nonfatal myocardial infarction. *American Journal of Cardiology*, 120(3), 352–358. <https://doi.org/10.1016/j.amjcard.2017.05.002>
- Noh, J., Lee, C. J., Hyun, D. S., Kim, W., Kim, M. J., Park, K. S., Koh, S., Chang, S., Kim, C., & Park, S. (2020). Blood pressure and the risk of major adverse cardiovascular events among firefighters. *Journal of Hypertension*, 38(5), 850–857. <https://doi.org/10.1097/HJH.0000000000002336>
- O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity*, 41(5), 673–690. <https://doi.org/10.1007/s11335-006-9018-6>
- O'Rourke, N. (2016). *Stress and anxiety of Irish based firefighters and their coping mechanisms*. Dublin Business School.

- Patton, G. C., Carlin, J. B., Coffey, C., Wolfe, R., Hibbert, M., & Bowes, G. (1998). Depression, anxiety, and smoking initiation: A prospective study over 3 years. *American Journal of Public Health, 88*(10), 1518–1522. <https://doi.org/10.2105/AJPH.88.10.1518>
- Paulus, D. J., Gallagher, M. W., Bartlett, B. A., Tran, J., & Vujanovic, A. A. (2018). The unique and interactive effects of anxiety sensitivity and emotion dysregulation in relation to posttraumatic stress, depressive, and anxiety symptoms among trauma-exposed firefighters. *Comprehensive Psychiatry, 84*, 54–61. <https://doi.org/10.1016/j.comppsy.2018.03.012>
- Poursadeghiyan, M., Abbasi, M., Mehri, A., Hami, M., Raei, M., & Ebrahimi, M. H. (2016). Relationship between job stress and anxiety, depression and job satisfaction in nurses in Iran. *The Social Sciences, 11*(9), 2349–2355. <https://acjih.ir/wp-content/uploads/2018/09/989.pdf>
- Rosenberg, M. (1965). *Rosenberg self-esteem scale (RSE). Acceptance and commitment therapy. Measures package* (Vol. 61). University of Wollongong.
- Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology, 69*(4), 719–727. <https://doi.org/10.1037/0022-3514.69.4.719>
- Saggino, A., Pappone, P., Del Castello, E., Grassi, P., Natullo, O., Nicotra, E. F., & Tommasi, M. (2015). *Lo stress nei lavoratori bancari. Il questionario Stress Organizzativo e Salute (SOS)* [working stress in banking employees. The Organizational and Health Stress Questionnaire]. Franco Angeli.
- Sardinas, A., Miller, J. W., & Hansen, H. (1986). Ischemic heart disease mortality of firemen and policemen. *American Journal of Public Health, 76*(9), 1140–1141. <https://doi.org/10.2105/AJPH.76.9.1140>
- Schaefer Solle, N., Caban-Martinez, A. J., Levy, R. A., Young, B., Lee, D., Harrison, T., & Kobetz, E. (2018). Perceptions of health and cancer risk among newly recruited firefighters in South Florida. *American Journal of Industrial Medicine, 61*(1), 77–84. <https://doi.org/10.1002/ajim.22785>
- Schaufeli, W. B., Salanova, M., Gonzalez-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A confirmatory analytic approach. *Journal of Happiness Studies, 3*(1), 71–92. <https://doi.org/10.1023/A:1015630930326>
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality and Social Psychology, 67*(6), 1063–1078. <https://doi.org/10.1037/0022-3514.67.6.1063>
- Setti, I., & Argentero, P. (2014). The role of mindfulness in protecting firefighters from psychosomatic malaise. *Traumatology: An International Journal, 20*(2), 134. <https://doi.org/10.1037/h0099398>
- Smith, B. W., Ford, C. G., & Steffen, L. E. (2019). The role of mindfulness in reactivity to daily stress in urban firefighters. *Mindfulness, 10*(8), 1603–1614. <https://doi.org/10.1007/s12671-019-01102-0>
- Stanley, I. H., Boffa, J. W., Smith, L. J., Tran, J. K., Schmidt, N. B., Joiner, T. E., & Vujanovic, A. A. (2018). Occupational stress and suicidality among firefighters: Examining the buffering role of distress tolerance. *Psychiatry Research, 266*, 90–96. <https://doi.org/10.1016/j.psychres.2018.05.058>
- Stanley, I. H., Hom, M. A., Spencer-Thomas, S., & Joiner, T. E. (2017). Examining anxiety sensitivity as a mediator of the association between PTSD symptoms and suicide risk among women firefighters. *Journal of Anxiety Disorders, 50*, 94–102. <https://doi.org/10.1016/j.janxdis.2017.06.003>
- Stoeber, J., Feast, A. R., & Hayward, J. A. (2009). Self-oriented and socially prescribed perfectionism: Differential relationships with intrinsic and extrinsic motivation and test anxiety. *Personality and Individual Differences, 47*(5), 423–428. <https://doi.org/10.1016/j.paid.2009.04.014>
- Thoits, P. A. (1985). Social support and psychological well-being: Theoretical possibilities. In I. G. Sarason & B. R. Sarason (Eds.), *Social support: Theory, research and applications* NATO ASI Series (D: Behavioural and Social Sciences), vol. 24. Springer. pp. 51–72.
- Tommasi, M., Grassi, P., Balsamo, M., Picconi, L., Furnham, A., & Saggino, A. (2018). Correlations between personality, affective and filial self-efficacy beliefs, and psychological well-being in a sample of Italian adolescents. *Psychological Reports, 121*(1), 59–78. <https://doi.org/10.1177/0033294117720698>
- Trichopoulos, D., Zavitsanos, X., Katsouyanni, K., Tzonou, A., & Dalla-Vorgia, P. (1983). Psychological stress and fatal heart attack: The Athens (1981) earthquake natural experiment. *The Lancet, 321*(8322), 441–444. [https://doi.org/10.1016/S0140-6736\(83\)91439-3](https://doi.org/10.1016/S0140-6736(83)91439-3)
- Turner, R. J. (1981). Social support as a contingency in psychological well-being. *Journal of Health and Social Behavior, 22*(4), 357–367. <https://doi.org/10.2307/2136677>
- Ueyama, T., Senba, E., Kasamatsu, K., Hano, T., Yamamoto, K., Nishio, I., Tsuruo, Y., & Yoshida, K. I. (2003). Molecular mechanism of emotional stress-induced and catecholamine-induced heart attack. *Journal of Cardiovascular Pharmacology, 41*(supplement 1), S115–S118. https://journals.lww.com/cardiovascularpharm/Fulltext/2003/01001/Molecular_Mechanism_of_Emotional_Stress_Induced.23.aspx
- Van Der Ploeg, E., & Kleber, R. J. (2003). Acute and chronic job stressors among ambulance personnel: Predictors of health symptoms. *Occupational and Environmental Medicine, 60*(suppl. 1), i40–i46. https://doi.org/10.1136/oem.60.suppl_1.i40
- Vargas de Barros, V., Martins, L. F., Saitz, R., Bastos, R. R., & Ronzani, T. M. (2013). Mental health conditions, individual and job characteristics and sleep disturbances among firefighters. *Journal of Health Psychology, 18*(3), 350–358. <https://doi.org/10.1177/1359105312443402>
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>



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