

Association of work-related stress with mental health problems in a special police force unit

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ABSTRACT

Objectives: Law and order enforcement tasks may expose special force police officers to significant psychosocial risk factors. The aim of this work is to investigate the relationship between job stress and the presence of mental health symptoms while controlling sociodemographical, occupational and personality variables in special force police officers.

Method: At different time points, 292 of 294 members of the 'VI Reparto Mobile', a special police force engaged exclusively in the enforcement of law and order, responded to our invitation to complete questionnaires for the assessment of personality traits, work-related stress (using the Demand–Control–Support (DCS) and the Effort–Reward–Imbalance (ERI) models) and mental health problems such as depression, anxiety and burnout.

Results: Regression analyses showed that lower levels of support and reward and higher levels of effort and overcommitment were associated with higher levels of mental health symptoms. Psychological screening revealed 21 (7.3%) likely cases of mild depression (Beck Depression Inventory, $BDI \geq 10$). Officers who had experienced a discrepancy between work effort and rewards showed a marked increase in the risk of depression (OR 7.89, 95% CI 2.32 to 26.82) when compared with their counterparts who did not perceive themselves to be in a condition of distress.

Conclusions: The findings of this study suggest that work-related stress may play a role in the development of mental health problems in police officers. The prevalence of mental health symptoms in the cohort investigated here was low, but not negligible in the case of depression. Since special forces police officers have to perform sensitive tasks for which a healthy psychological functioning is needed, the results of this study suggest that steps should be taken to prevent distress and improve the mental well-being of these workers.

INTRODUCTION

It is generally agreed that mental health disorders have a multifactorial aetiology and, in the past few decades, research has focused on the role of working conditions in determining people's mental health.^{1 2} In fact,

ARTICLE SUMMARY

Article focus

- Mental health in special police forces is a critical issue. Police officers are exposed to acute and chronic stress and may develop mental health problems. The impairment of police officers' psychological functioning can be a serious threat to the safety of the public.

Key message

- The prevalence of mental health problems in special force police officers is lower than that of the general population and other groups of police job distress (or job stress) measures and mental health symptoms was found. The prevention of distress and the treatment of mental health disorders among police officers are necessary for the safety of the workers themselves and the public.

Strengths and limitations of this study

- This is the first study to investigate the association of job distress with mental health symptoms in a special force police unit. It has a high participation rate. The study has been conducted on a relatively small cohort, and with only self-report measures.

workers themselves often report that their work affects their health³ and intangible costs arising from the suffering of workers are being added to direct financial costs due to absenteeism, presenteeism, reduced productivity and compensation. Police officers operating in special force units engaged in law enforcement and riot control are a category of workers that is considered particularly at risk for the development of mental health disturbances because of the possible exposure to violent events and traumas and hence to post-traumatic stress disorder, but in fact traumatic accidents rarely occur. However, the long-term effect of the psychological stress due to the constant risk of being injured, wounded or even killed while on patrol and to the witnessing of violence and death tends to be overlooked. This may

not be immediately perceived as detrimental, but it can still induce maladaptive reactions.³ Although it has been shown that police officers are more resilient to stress than civilians,^{4–7} several studies have provided evidence that adverse work conditions are related to poor mental health outcomes.⁸ In addition to these operational work-related challenges, police officers may be exposed to organisational problems that are common within hierarchical, male-dominated paramilitary structures such as firefighting, ambulance and paramedical services.^{9–10} Paradoxically, daily organisational stressors may be more challenging than operational experiences, as shown by a recent study in which reported levels of perceived stress in a group of police officers were higher during routine jobs than during a high-risk public event.¹¹ Both a dramatic violent event as well as a repeated and prolonged series of administrative events can cause an allostatic load, that is, a neurobiological maladaptive reaction due to being forced to adapt to challenging environments characterised by behavioural and emotional changes known as ‘distress’.¹² Through interaction with many different individual factors, distress can induce the occurrence of mental disorders such as anxiety, depression, burnout, conversion disorder and other conditions classified in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV).¹³ Psychological dysfunction resulting from job distress can be a gradual and progressive process that impairs well-being over time. This gradual evolution often leaves the worker unaware of the problem, or unwilling to acknowledge its importance, at least until the severity of the symptoms makes it clear to colleagues, family or both. The recognition of emotional problems due to work-related distress is rarely, if ever, encouraged in the law enforcement sector, since it is considered as a sign of weakness.¹⁴ Consequently, police officers fail to seek professional help early enough to prevent diagnosis and quickly benefit from treatment. This is one of the main reasons for which mental disorders are the leading cause of retirement in the police force.¹⁵

The two leading models that have been used to describe and explain individual perception of stress factors are the Demand–Control–Support (DCS) model, developed by Karasek,¹⁶ and the Effort–Reward–Imbalance (ERI) model, developed by Siegrist.¹⁷ The DCS model assumes that the primary sources of job stress, or ‘job strain’, stem from two basic characteristics of the job itself: ‘job demand’ and ‘job control’. The model predicts that job strain is not simply a function of job demand, but also depends on the amount of control the worker has over the work. Job demand takes into consideration the pace and intensity of work: work overload, degree of difficulty, available time, time allotted to executing tasks and the existence of contradictory or conflicting orders. Job decision latitude, or job control, refers to the worker’s ability to control his own activities and skill usage. Social support at work, a moderating factor of job strain, was subsequently included in the

model. According to this model, high psychological demands in conjunction with low decision latitude can contribute to the development of psychological problems, and workers with high job strain and low social support at work are thought to be the most vulnerable to negative health effects (the so-called isolated strain, or isostrain hypothesis).¹⁸

The ERI model puts emphasis more on the reward rather than the control structure of work, suggesting that mental distress and its health correlates arise when a high degree of effort is not adequately rewarded in the form of pay, esteem, status consistency or career opportunities. A further assumption of this model involves individual differences in the perception of ERI: people with a motivational pattern of excessive work-related commitment and high need for approval (overcommitment) are at increased risk of strain, and, consequently, health problems.¹⁷ The DCS model, developed in the 1960s, appears to be more suitable for the physical aspects of occupational stress, while the ERI model, designed for the tertiary society of the 1980s, is more sensitive to stress arising from work relations and organisational factors.¹⁹

Unfortunately, in the literature there is no agreed definition of ‘distress’, although there is some consensus in considering it as an unfavourable and unpleasant response to stress. Owing to such a vague definition, the prevalence of workers with distress in published studies can range from 5% to 50%.^{20–22} When distress reaches clinical relevance it is defined as ‘stress-related disorder’. This term includes a variety of clinical conditions, which are collectively labelled as ‘common mental disorders’ (CMDs)²³ and one of the most common diagnoses is depression.²⁴ However, a systematic review of evidence on psychosocial factors at work and depression revealed a high degree of study heterogeneity,²⁵ although other studies found moderate evidence of a relationship between the psychological demands of a job and the development of depression, with relative risks of approximately.²⁶ Distress and mental health problems caused by work can affect the performance of professional activity, especially in a sensitive area, such as law enforcement. The consequences of stress on the mental health of police officers can thus be particularly serious not only for the increased risk of individual health problems, but also on account of the increased risk of impaired work performance that could jeopardise the safety and health of the general population. For instance, as reported by Violanti,²⁷ depression can be a contributing factor not only in early retirement, but also in police officer suicides, murder–suicides, domestic violence, unnecessary violence and aggression while in service that occurs over and above the role played by police culture that might encourage aggressive and authoritarian attitudes.

Sadly, investigating stress in police officers is particularly difficult because they are afraid of being identified as individuals who have been compromised by stress.

They fear that this might then cause them to be discriminated against in their careers, removed from active duties and relegated to office work. On the other hand, a study by Summerfield¹⁵ found work stress to be the first cause of sickness absence and a reduction in operational duties, as well as the leading cause of ill-health retirement in police officers. A number of studies have previously evaluated occupational stress in policemen using ERI and DCS models. Job strain and ERI were associated with cardiovascular risk in policewomen,²⁸ musculoskeletal disorders in special police forces,²⁹ lower mental health level in correctional³⁰ and urban police officers.³¹ The DCS model proved to be a valid theoretical framework for explaining professional efficiency and exhaustion³² and the complex interplay between job demands, emotional exhaustion and other social and individual factors.³³ Officers with greater perceived work stress in the first year of police service showed more severe depression symptoms 12 months later.³⁴

The aim of this study was to investigate the association of a condition of 'distress' with the presence of self-reported symptoms of depression, anxiety and burnout, in a special force unit of the Italian police while controlling for sociodemographical and occupational variables and personality traits. Previous studies on this cohort have shown that younger officers, those who were single, had a shorter length of service, lived in barracks, had a lower rank and who were closer to their families had a higher short-term sickness absence risk³⁵ and that DCS control and support and ERI reward measures were negatively related to frequency of absence and short-term absence and that DCS demand and ERI effort measures were positively related to total lost days.³⁶ Moreover, it has been reported that the majority of these officers described themselves as much more emotionally stable and slightly to moderately more extraverted, agreeable, conscientious and open to experience than the general population and career soldiers⁴ and that some personality traits (mainly emotional stability and agreeableness) were associated to perceived stress levels or reactivity to environmental stressors.³⁷

METHOD

Participants

Participants were the members of 'VI Reparto Mobile' of Genoa, a police special force unit called on to maintain law and order in all the major public events that take place in Italy. These officers work exclusively as first responders; they are carefully selected from ordinary officers and receive specific psychophysical and tactical training. Their routine work involves ensuring order during sporting events, crowds and parades, natural and social emergencies, and they are also often involved in public events in which there is a high risk of terrorist attacks and physical clashes. During a single riot, they are on duty for an average of 10 or more hours of work,

are engaged in physical clashes for over an hour on average, and often feel that they are in imminent danger of death. They have a special and ongoing education which aims to improve team spirit ('esprit de corps') and increase their preparation for dramatic events. The decision to hold the 2009 G8 meeting in Italy provided the opportunity for carrying out our present study. The police officers selected to ensure law and order during this event were asked to undergo a thorough examination of their mental health condition so that their conduct during the meeting could not be stigmatised.

The unit is composed of 294 members. Two officers refused to take part in the study and one was unable to complete all the tests in the battery described in the next section and was therefore excluded. The participation rate was 99%. Since only two officers were women, gender differences could not be assessed and were therefore excluded from the analyses. The final group of participants therefore comprised 289 officers (see table 1 for descriptive statistics of the sociodemographic variables).

MATERIALS

Personality measure

Big Five Questionnaire (BFQ)^{38 39} is a self-report measure of the Big Five personality traits: energy (E, extraversion), friendliness (F, agreeableness), conscientiousness (C), emotional stability (S, the opposite of neuroticism) and openness (O). Each scale contains 24 short phrases that eliminate some of the ambiguity that might arise when using single adjectives. Participants are asked to rate the degree to which each item adequately describes them on a five-point Likert-type scale ranging from complete disagreement (1, absolutely false for me) to complete agreement (5, very true for me). Total raw scores, ranging for each variable from 24 to 120, were converted before analyses into standardised T scores (M=50, SD=10) using the Italian norms published in Caprara *et al.*³⁸ In this study reliabilities (Cronbach's α) of the scales were E=0.69, F=0.80, C=0.82, S=0.88 and O=0.77.

Stress measures

Occupational stress was assessed using the validated Italian versions⁴⁰ of two standardised questionnaires: *DCS* questionnaire, derived from the longer *Job Content Questionnaire*,¹⁶ and the *ERI* questionnaire.¹⁷ DCS is a 17-item self-report questionnaire that provides scores on three scales: *Psychological Job Demand*, (Demand, 5 items mapping quantitative aspects of work, such as time required to perform tasks and conflict among different demands), *Job Control/Decision Latitude* (Control, 6 items mapping the use and development of skills and autonomy in making decisions about the work process) and *Workplace Social Support* (Support, 6 items mapping relationships between coworkers and superiors). Participants are asked to rate each item on a four-point frequency

Table 1 Sociodemographical and occupational characteristics, personality scores, occupational stress scores and mental health scores of the participants in this study (n=289)

Variable	Statistics
Sociodemographical variables	
Age, years (M±DS)	35.4±7.5
Length of service, years (M±DS)	14.0±7.9
Rank, superintendent or technical staff, frequency (%)	140 (48.4)
Education level, high school or higher, frequency (%)	217 (75.1)
Origin, Northern Italy, frequency (%)	145 (50.2)
Living in barracks, frequency (%)	162 (56.1)
Married or cohabiting, frequency (%)	108 (37.4)
Personality variables	
BFQ energy/extraversion (M±DS)	52.9±8.3
BFQ friendliness/agreeableness (M±DS)	55.3±10.5
BFQ conscientiousness (M±DS)	52.6±8.6
BFQ emotional stability (M±DS)	62.0±8.2
BFQ openness (M±DS)	51.2±9.1
Occupational stress variables	
DCS Demand (M±DS, range 5–20)	13.4±2.02
DCS Control (M±DS, range 6–24)	13.3±2.7
DCS Support (M±DS, range 6–24)	18.6±2.9
DCS job strain (Demand/Control ratio, M±DS)	1.31±0.41
ERI Effort (M±DS, range 6–30)	15.0±3.2
ERI Reward (M±DS, range 11–55)	42.3±6.2
ERI overcommitment (M±DS, range 6–24)	6.9±1.9
ERI weighted effort/reward ratio (M±DS)	0.70±0.28
Mental health variables	
BDI (M±DS, range 0–63)	3.3±4.2
STAI-T (M±DS, range 20–50)	27.5±4.3
MBI emotional exhaustion (M±DS, range 9–36)	17.4±7.9
MBI depersonalisation (M±DS, range 5–35)	9.3±4.5
MBI personal accomplishment (M±DS, range 8–56)	42.7±9.8

BDI, Beck Depression Inventory^{43 44}; BFQ, Big Five Questionnaire^{38 39}; DCS, Demand–Control–Support Questionnaire^{16 40}; ERI, Effort–Reward–Imbalance Questionnaire^{17 40}; M, mean; MBI, Maslach Burnout Inventory^{50 51}; STAI-T, State-Trait Anxiety Inventory-Trait.^{48 49}

(Demand and Control) or agreement (Support) scale. In this study reliabilities (Cronbach's α) of the scales were 0.71, 0.65 and 0.84, respectively. Along with scale sum scores, a further index, 'perceived job strain' (DCS job strain) was computed by dividing the mean item score of Demand by the mean item score of the Control scale. A ratio of 1 indicates a balance between Demand and Control; values >1 indicate excessive perceived job strain.⁴¹ ERI is a 23-item self-report questionnaire that assesses three dimensions: *Effort* (6 items mapping the demanding aspects of the work environment), *Reward* (11 items mapping the occupational rewards that the worker expects to receive) and *Overcommitment* (6 items mapping the intrinsic personal factors regarding occupational motivation and participation that enhance the

effects of stress). Participants are asked to rate each item on a five-point intensity scale. In this study, reliabilities of the scales were 0.82, 0.89 and 0.79, respectively. Along with scale sum scores, the weighted ratio between effort and reward (E/R ratio) was computed to quantify the degree of mismatch between effort and reward. Values >1 reflect an imbalance that can induce stress.⁴²

Mental health measures

Depression was evaluated by the *Beck Depression Inventory* (BDI),⁴³ as this questionnaire proved to be effective for depression screening.^{44 45} The BDI consists of 21 groups of four alternative self-evaluation statements used to assess the presence and severity of the affective, cognitive, motivational, psychomotor and vegetative components of depression, with higher scores indicating more severe depression. If multiple responses are chosen under one item, the most symptomatic item is scored. Statement choices are scored from 0 (absent) to 3 (severe) and can total from 0 to 63. In this study, internal consistency was 0.81. The cut-off score commonly used in clinical practice for depression screening is 10.⁴⁶ The probability of suffering major depressive disorder rapidly increases above this threshold, so a higher score of 14⁴⁴ or 16⁴⁵ is often chosen in order to reduce the prevalence of false positive in populations consisting of patients affected by chronic diseases with poor or severe prognosis. In this study, we adopted the classical cut-off level of 10, as the participants tested were young, active and highly selected.

Anxiety was assessed with the *State-Trait Anxiety Inventory-Trait* (STAI-T)⁴⁷ Italian version.⁴⁸ The STAI-T is a 20-item self-report measure of anxiety proneness requiring participants to rate their frequency of anxiety symptoms on a four-point Likert-type scale. Nine items are reverse scored. According to⁴⁸ the cut-off score used in clinical practice for anxiety screening is 40. In this study the reliability of the scale was 0.74.

The *Maslach Burnout Inventory* (MBI)⁴⁹ Italian version⁵⁰ is a 22-item self-report measure of professional burnout. It provides scores on three facets of burnout: professional exhaustion (PE, 9 items mapping feelings of being emotionally overextended and exhausted by one's work), depersonalisation (DP, 5 items mapping an unfeeling and impersonal response towards the recipients of one's care) and personal accomplishment (PA, 8 items mapping feelings of competence and successful achievement in one's work with people). Participants are asked to rate the frequency of experiencing feelings related to each subscale using a seven-point Likert-type scale. According to Violante *et al.*,⁵¹ a burnout condition can be defined by scores higher than 23 on PE, higher than 8 on DP and lower than 30 on PA. In this study reliabilities of the scales were PE=0.86, DP=0.60 and PA=0.80, respectively.

Control variables

The control variables used in our study were: age (years), length of employment (years of service), education level

(lower vs equal/higher than high school), rank (officer vs supervisor/technical staff), origin (Northern or Southern Italy), housing (in barracks or home), marital status (single/divorced vs married/cohabiting) and presence of children (no/yes).

Procedure

Personality traits were assessed in January 2009. Perceived stress was measured on three separate occasions: (1) in January 2009, when officers were engaged only in routine work; (2) in April 2009, when they underwent specific training in preparation for the meeting and (3) in July 2009, shortly before the Genoa G8 summit meeting took place. Following the procedure already adopted in previous work,^{36 37} we averaged the three measurements into a single value, to obtain the level of stress that each officer had experienced during that period. Mental health was assessed in September 2009.

Ethics

All participants were tested anonymously and confidentially during their routine psychophysical assessment. Anonymity was achieved by identifying participants with an alphanumeric code, double blind. The study protocol was approved by the Ethics Committee of the Università Cattolica del Sacro Cuore, Faculty of Medicine, the Institute of Occupational Medicine, responsible for co-coordinating the study, and the National Police Management Board and the whole procedure followed the Ethical Principles of Psychologists Code of Conduct (American Psychological Association 2002).

Statistical analyses

The first research question we addressed was whether there was a relationship between the individual level of work-related stress and mental health problems after controlling for sociodemographical and personality variables. In order to do this we used hierarchical multiple linear regression models in which BDI, STAI and MBI scores were specified as criteria. In model 1, only the control variables were specified as predictors. In model 2, the BFQ personality scores were entered in the regression model. In models 3 and 4, scale scores from the DCS and from the ERI questionnaires, respectively, were added as further predictors. In model 5, control variables, BFQ personality scores and DCS and ERI scores were specified as predictors. The degree of association between variables was indexed by the regression coefficient computed on the standardised variables (β). The amount of variance of the depression score accounted for by the predictors (and the goodness of fit of the regression model) was indexed by the adjusted R^2 . Since age and length of employment were highly correlated ($r=0.91$), only the latter was used as a predictor. In order to minimise the potentially confounding effects of multicollinearity, we partialised the effects through principal component analysis.

We then tested the risk of suffering from depression, anxiety and burnout for a police officer in a state of distress. We used binary logistic regression, and caseness for each construct was defined as a BDI score ≥ 10 for depression, a STAI score >40 for anxiety, MBI-PE >23 and MBI-DP >8 and MBI-PA <30 for burnout. DCS job strain, social isolation (DCS-Support score below the median), isostrain (job strain plus social isolation, ie, support below the median), ERI ratio (E/R ratio >1) and overinvolvement in work (ERI-overcommitment score above the median) were used as predictors. The resulting values ('raw' or unadjusted) were subsequently corrected by adding the sociodemographic variables to the equation. ORs and their 95% CIs were computed.

RESULTS

Mean scale scores are reported in table 1. The mean levels of occupational stress scores were not particularly high when compared with those of other groups of Italian workers.¹⁹ The average scores of depression, anxiety, emotional exhaustion and DP were close to the lower limits of the respective scales, while those of PA were high. On the basis of the Italian cut-off levels, only one case of possible anxiety and three cases of possible burnout were observed. However, there were 21 (7.3%) likely cases of mild depression (BDI ≥ 10) and 7 (2.4%) likely cases of moderate depression (BDI ≥ 16). Given the negligible prevalence of possible anxiety or burnout, we applied the logistic analysis exclusively to depression.

Hierarchical multiple linear regression allowed us to test the extent to which the level of mental health symptomatology could be predicted on the basis of sociodemographic, occupational, personality and work-related stress data (table 2).

The association between depression and sociodemographic variables (model 1) was weak (adjusted $R^2=0.01$) and generally not significant, except for a positive association with length of employment. When personality traits were entered into the model (model 2), a significant increase in adjusted R^2 was observed due to the significant negative effect of emotional stability. A further significant increase in the proportion of variance of BDI score accounted for was observed also when DCS and ERI scores were entered (models 3–5). DCS control, DCS support and ERI reward showed a negative effect, whereas ERI effort and ERI reward showed a positive effect.

The results of the logistic regression are shown in table 3.

For officers in a state of 'distress' according to the DCS model (ie, those with a simultaneous high level of 'demand' and low level of 'control'), the risk of being depressed approximately doubled, but not significantly, whereas the other categorical predictors were all statistically significant. Notably, officers with an ERI-E/R ratio higher than 1 had an approximately sevenfold higher risk of depression than the others.

Table 2 Standardised regression coefficients (β) for control sociodemographic variables, personality and occupational stress variables as predictors of Beck Depression Inventory scores

Predictor	Model 1	Model 2	Model 3	Model 4	Model 5
Control variables					
Length of employment (years)	0.12*	0.08	0.10	0.11	0.14*
Rank	-0.06	-0.06	-0.06	-0.02	-0.01
Education	0.07	0.08	0.09	0.08	0.09
Origin	-0.03	-0.03	-0.05	-0.03	-0.05
Marital status	-0.02	-0.01	0.02	0.00	0.03
Barracked	-0.10	-0.12*	-0.11	-0.10	-0.07
Children	-0.03	-0.03	-0.02	-0.02	-0.01
Personality variables					
BFQ energy/extraversion		-0.07	-0.07	-0.07	-0.06
BFQ friendliness/agreeableness		-0.08	-0.08	-0.08	-0.09
BFQ conscientiousness		-0.05	-0.05	-0.05	-0.05
BFQ emotional stability		-0.23***	-0.22***	-0.22***	-0.21***
BFQ openness		0.00	0.00	0.00	0.00
Occupational stress variables					
DCS Demand			0.08		0.08
DCS Control			-0.10		-0.13*
DCS Support			-0.17**		-0.16**
ERI Effort				0.16**	0.16**
ERI Reward				-0.21***	-0.21***
ERI overcommitment				0.16**	0.16**
Adjusted R ²	0.01	0.06**	0.09***	0.14***	0.18***

n=289.

*p<0.05.

**p<0.01.

***p<0.001.

Barracked, no=0, yes=1; BFQ, Big Five Questionnaire^{38,39}; children, no=0, yes=1; DCS, Demand–Control–Support Questionnaire^{16,40}; education, high school or higher=0, lower than high school=1; ERI, Effort–Reward–Imbalance Questionnaire^{17,40}; marital status, single or divorced=0, married or cohabiting=1; origin, Northern Italy=0, Southern Italy=1; rank, agent ('agent' or 'first class agent')=0, other=1.

The results of regression analyses performed using anxiety as the criterion are reported in table 4.

Sociodemographical and occupational variables accounted for a negligible proportion of variance of the anxiety score (model 1), with living in barracks being the only significant predictor. Entering personality traits as further predictors (model 2) substantially improved the fit of the model, and lower extraversion,

agreeableness and emotional stability were associated with higher anxiety levels. The inclusion of DCS and ERI scores as predictors (models 3–5) further increased the adjusted R². Results suggested that lower support, higher effort and lower rewards predicted higher anxiety.

Table 5 reports the results of the regression analyses carried on with MBI scores as criteria.

Table 3 ORs for the association between risk of major depression (Beck Depression Inventory score ≥ 10) and occupational stress indicators, unadjusted and adjusted†

Occupational stress variable	Prevalence—cases, n (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
DCS job strain (weighted Demand/Control ratio >1)	73 (25.3)	1.92 (0.76 to 4.84)	3.06 (0.97 to 9.66)
Social isolation (DCS-Support score below the median)	154 (53.3)	3.01 (1.07 to 8.46)*	2.80 (0.88 to 8.87)
Isostrain (job strain+social isolation)	50 (17.3)	2.62 (0.99 to 6.86)	3.47 (1.08 to 11.10)*
ERI-Effort/Reward imbalance (effort/reward ratio >1)	32 (11.1)	6.26 (2.36 to 16.59)***	7.89 (2.32 to 26.82)***
ERI overinvolvement in work (overcommitment score above the median)	37 (12.8)	3.06 (1.11 to 8.46)*	3.27 (1.01 to 10.63)*

n=289.

*p<0.05.

***p<0.001.

†Adjustments were made for age, length of employment, rank, education level, origin, being married or cohabiting, living in barracks, having children and personality scores.

DCS, Demand–Control–Support Questionnaire; ERI, Effort–Reward–Imbalance Questionnaire.

Table 4 Standardised correlation coefficients (β) for control sociodemographic variables, personality and occupational stress variables as predictors of State-Trait Anxiety Inventory-Trait scores

Predictor	Model 1	Model 2	Model 3	Model 4	Model 5
Control variables					
Length of employment (years)	0.08	0.02	0.03	0.04	0.06
Rank	0.06	0.06	0.05	0.10	0.09
Education	0.03	0.01	0.01	0.01	0.01
Origin	-0.07	-0.07	-0.09	-0.07	-0.09
Marital status	0.02	0.03	0.05	0.04	0.06
Barracked	0.13*	0.10	0.10	0.12*	0.12*
Children	-0.06	-0.07	-0.07	-0.05	-0.05
Personality variables					
BFQ energy/extraversion		-0.13*	-0.13*	-0.13*	-0.13*
BFQ friendliness/agreeableness		-0.13*	-0.13*	-0.13*	-0.13*
BFQ conscientiousness		-0.04	-0.04	-0.05	-0.05
BFQ emotional stability		-0.33***	-0.33***	-0.32***	-0.32***
BFQ openness		-0.09	-0.09	-0.10	-0.10
Occupational stress variables					
DCS Demand			0.01		0.01
DCS Control			-0.03		-0.05
DCS Support			-0.19***		-0.18***
ERI Effort				0.19***	0.19***
ERI Reward				-0.15**	-0.15**
ERI overcommitment				0.05	0.05
Adjusted R ²	0.01	0.15***	0.18***	0.20***	0.23***

n=289.

*p<0.05.

**p<0.01.

***p<0.001.

Barracked, no=0, yes=1; BFQ, Big Five Questionnaire^{38,39}; children, no=0, yes=1; DCS, Demand–Control–Support Questionnaire^{16,40}; education, high school or higher=0, lower than high school=1; ERI, Effort–Reward–Imbalance Questionnaire^{17,40}; marital status, single or divorced=0, married or cohabiting=1; origin, Northern Italy=0, Southern Italy=1; rank, agent ('agent' or 'first class agent')=0, other=1.

MBI-PE scores were higher in agents (as opposed to supervisors/technical staff) (model 1) and in officers with lower emotional stability (model 2), and were associated with higher demand, higher effort, higher overcommitment and lower reward (models 3–5). DP scores were lower in officers with children (model 1), in more agreeable and emotionally stable officers (model 2) and in officers with higher levels of control, support and reward and lower levels of effort and overcommitment (models 3–5). PA scores were not related to any sociodemographical and occupational variable (model 1), but were positively predicted by all personality traits (model 2). Control was the only stress-related variable to be significantly associated with this scale score.

DISCUSSION

This study investigated the association between a condition of job distress and the presence of self-reported mental health symptoms, in a special police force unit while controlling for sociodemographical, occupational and personality variables. Results from multiple regression analyses showed that sociodemographical and occupational variables accounted for a negligible proportion of variance of mental health problems, although, consistently with a previous study on the same cohort³⁵

higher length of employment, lower rank, being barracked and not having children were significant predictors of higher symptomatology. Emotional stability was a significant predictor for all the measures of mental health problems, which was expected given the large body of research that has shown that this trait is associated with several mental disorders and physical health problems, and that this is not an artefact of the overlapping of some symptoms with questionnaire items.⁵² Lower levels of agreeableness (eg, hostility) and extraversion were associated with higher anxiety and lower professional accomplishment, consistent with previous studies on the predictive power of these traits for psychological health and occupational outcomes.⁵³ However, the focus of this study was on the role of job stressors, and results showed that they can account for a further and substantial amount of variance of mental health measures. All ERI and DCS scales except demand were significant predictors of depressive symptoms, and results from logistic regression analyses revealed that a higher ERI was associated with an approximately seven-fold increase in risk of depression. These results suggest that, consistent with previous studies, also in the case of special force police officers, a lower autonomy in making decisions, poorer relationships between coworkers and superiors, lower reward opportunities (or

Table 5 Standardised correlation coefficients (β) for control sociodemographic variables, personality and occupational stress variables as predictors of MBI—professional exhaustion, depersonalisation and personal accomplishment scores

Predictor	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Professional exhaustion</i>					
Control variables					
Length of employment (years)	0.13*	0.09	0.10	0.12*	0.14**
Rank	-0.20***	-0.20***	-0.20***	-0.14**	-0.14*
Education	0.06	0.07	0.07	0.05	0.06
Origin	-0.02	-0.02	-0.04	-0.02	-0.03
Marital status	-0.05	-0.05	-0.03	-0.04	-0.01
Barracked	-0.05	-0.08	-0.07	-0.04	-0.03
Children	-0.09	-0.09	-0.09	-0.08	-0.08
Personality variables					
BFQ energy/extraversion		-0.10	-0.09	-0.09	-0.09
BFQ friendliness/agreeableness		-0.08	-0.08	-0.09	-0.09
BFQ conscientiousness		-0.04	-0.04	-0.04	-0.04
BFQ emotional stability		-0.23***	-0.22***	-0.21***	-0.21***
BFQ openness		0.04	0.03	0.03	0.03
Occupational stress variables					
DCS Demand			0.12*		0.12*
DCS Control			-0.07		-0.09
DCS Support			-0.09		-0.08
ERI Effort				0.21***	0.21***
ERI Reward				-0.16**	-0.16**
ERI overcommitment				0.27***	0.27***
Adjusted R ²	0.05**	0.11***	0.13***	0.24***	0.26***
<i>Depersonalisation</i>					
Control variables					
Length of employment (years)	0.08	0.03	0.05	0.06	0.09
Rank	-0.08	-0.06	-0.06	-0.02	-0.01
Education	0.00	0.00	0.01	0.00	0.02
Origin	-0.02	-0.04	-0.06	-0.03	-0.05
Marital status	-0.09	-0.06	-0.04	-0.05	-0.03
Barracked	-0.05	-0.07	-0.06	-0.04	-0.03
Children	-0.18**	-0.16**	-0.16**	-0.15**	-0.14**
Personality variables					
BFQ energy/extraversion		0.08	0.08	0.08	0.09
BFQ friendliness/agreeableness		-0.23***	-0.24***	-0.24***	-0.24***
BFQ conscientiousness		-0.02	-0.02	-0.02	-0.03
BFQ emotional stability		-0.24***	-0.24***	-0.23***	-0.23***
BFQ openness		-0.02	-0.02	-0.02	-0.02
Occupational stress variables					
DCS Demand			0.03		0.03
DCS Control			-0.09		-0.12*
DCS Support			-0.17**		-0.17***
ERI Effort				0.16**	0.16**
ERI Reward				-0.23***	-0.24***
ERI overcommitment				0.14**	0.14**
Adjusted R ²	0.03*	0.14***	0.17***	0.23***	0.26***
<i>Personal accomplishment</i>					
Control variables					
Length of employment (years)	0.06	0.09	0.05	0.08	0.03
Rank	0.01	-0.02	-0.05	-0.05	-0.08
Education	0.01	0.03	-0.01	0.04	0.00
Origin	0.09	0.08	0.09	0.08	0.09
Marital status	0.11	0.06	0.04	0.06	0.03
Barracked	-0.09	-0.06	-0.10	-0.07	-0.11*
Children	0.05	0.03	0.01	0.03	0.00

Continued

Table 5 Continued

Predictor	Model 1	Model 2	Model 3	Model 4	Model 5
Personality variables					
BFQ energy/extraversion		0.15**	0.14**	0.15**	0.14**
BFQ friendliness/agreeableness		0.26***	0.27***	0.26***	0.27***
BFQ conscientiousness		0.23***	0.24***	0.23***	0.24***
BFQ emotional stability		0.18***	0.17**	0.18**	0.16**
BFQ openness		0.17**	0.16**	0.17**	0.16**
Occupational stress variables					
DCS Demand			-0.02		-0.02
DCS Control			0.19***		0.20***
DCS Support			0.03		0.02
ERI Effort				-0.08	-0.09
ERI Reward				0.06	0.07
ERI overcommitment				-0.09	-0.10
Adjusted R ²	0.01	0.20***	0.23***	0.21***	0.24***

n=289.

*p<0.05.

**p<0.01.

***p<0.001.

Barracked, no=0, yes=1; BFQ, Big Five Questionnaire^{38 39}; children, no=0, yes=1; DCS, Demand–Control–Support Questionnaire^{16 40}; education, high school or higher=0, lower than high school=1; ERI, Effort–Reward–Imbalance Questionnaire^{17 40}; marital status, single or divorced=0, married or cohabiting=1; MBI, Maslach Burnout Inventory^{50 51}; origin, Northern Italy=0, Southern Italy=1; rank, agent ('agent' or 'first class agent')=0, other=1.

higher imbalance between the effort spent to meet the demanding aspects of the work environment and the rewards), a more demanding work environment and a higher commitment can be associated with higher the depressive symptomatology. A recent meta-analysis of studies on the association between stress and mental disorders indicated that psychosocial problems in the workplace, reduced control, job strain, low social support and the discrepancy between effort and rewards predict the onset of depression.⁵⁴ Another review of 14 longitudinal studies reported that lack of social support enhanced depression.²⁶ The association we found between low reward and symptoms is in agreement with that suggested by neurobiological studies on depression.⁵⁵

Albeit to a lesser extent, the DCS and the ERI model showed a good ability to predict anxiety. Differently from other studies that found that all the three components of DCS were significant predictors of anxiety,⁸ in this study only support, that is, the quality of relationships between coworkers and superiors, was significant, suggesting that this dimension might play a central role in the development of anxiety in special force police officers. Results for the ERI model were also only partially consistent with the literature, which found little predictive power of ERI scales for anxiety,⁵⁶ since in the cohort under study higher efforts needed to meet the demands of the working environment and lower occupational rewards were associated with higher anxiety.

As for burnout, all ERI scales proved to be useful in predicting PE and DP, since higher effort and overcommitment and lower reward were associated with higher scores, whereas they did not account for a substantial amount of variance or PA. At least one DCS scale significantly predicted each burnout dimension (demand

predicted PE, control and support predicted DP, and control predicted PA).

Taken together, these results suggest that for special force police officers prediction models that include both the DCS and the ERI scores can provide a substantially greater predictive power for mental health symptoms than models that include only sociodemographical and occupational variables and personality traits. These results are consistent with some of the previous studies (eg, Ref. ⁵⁷ on engineers) but not with others (eg, Ref. ⁵⁶ on civil servants), possibly suggesting that the effects of the dimensions of job distress on mental health might be the outcome of a complex interaction among the peculiar features of each occupation and the psychological characteristics of the workers, which necessarily self-select into occupations. In the very case of the officers assessed in this study, poor relationships between coworkers and superiors, higher efforts spent and lower rewards received are likely to elicit mental health problems, whereas the use and development of skills and autonomy in making decisions about the work process and the intrinsic personal factors regarding occupational motivation and participation may play a role for some specific problems. These findings replicate the observations of Martins and Lopes⁵⁸ who reported that effort, reward and overcommitment are associated with the presence of CMDs among military personnel in peacetime, and those of Kingdom and Smith⁵⁹ who showed that ERI was the most important predictor of depression among police officers in the UK Coast Guard. More generally, our results are in agreement with a large body of literature on the relationship between reward processing and depressive symptoms.⁵⁵ The DCS model captured some important aspects, such as the lack of control over

the organisation of work and the lack of support from colleagues or superiors. The role of lack of support from superiors and on the part of the organisation to which the worker belongs in the occurrence of depression has already been reported by Berg *et al*⁶⁰ in the Norwegian police, and by Arial *et al*⁶¹ in a sample of Swiss police.

It might be argued that only 7% of police officers in our cohort reported a level of depressive symptomatology higher than the risk threshold. In fact, such prevalence is lower than that found by Fox *et al*⁶² in urban US police officers (9%), by Frühwald *et al*⁶³ in Lower Austria (9%), by Arial *et al*⁶¹ in Swiss police officers (11.9%), by Chen *et al*⁶⁷ in Taiwanese police officers (21.6%) and by Obidoa *et al*⁶⁴ among US corrections officers (31%), and it is comparable with that found in other working populations.^{24 65} Moreover, a nationwide study in the Norwegian police service showed that the younger police officers reported lower levels of depressive symptoms than the corresponding general population.⁶⁰ A recent comparison of police and other employees found no indications that self-reported mental health disturbances are more prevalent among police officers than among groups of employees that are not considered to be high-risk groups.⁶⁶ Since our sample was composed of young and highly selected police officers, whose emotional stability was higher than the general population,⁴ this result is not surprising. However, this does not mean that the problem of depression in this special unit is negligible. It must not be overlooked that depression represents a considerable cost for productivity both in terms of absenteeism and presenteeism⁶⁷ and more importantly, given the highly sensitive tasks the officers of this study have to accomplish, it increases the possibility of errors and the risk to the health and safety of others. Police officers with depressive symptoms should therefore be given timely and confidential assistance⁶⁸ and the causes of excessive occupational stress should be promptly identified and removed or minimised.

The results reported in this study should be interpreted with caution. First, as all the measures were self-reported questionnaires, and reporting bias and subjectivity may therefore have distorted the observations. Depressed persons could be more likely to report psychosocial stress at work, even if objectively their work environment is not at risk per se. Second, the fact that job distress variables were measured before mental health symptoms supports prediction but not necessarily a causal hypothesis, since mental health symptoms could have been present even *before* or *during* the assessment of job distress. Specifically, we could not address the issue of whether the observed reduction in experience of reward is an epiphenomenon of the presence of mental health symptoms. Finally, because our sample corresponds to a specific police unit, and it is a relatively small cohort, our results may not be generalisable to police officers with different occupational exposure, or to special forces in countries with different ethnic or cultural characteristics. However, our study also has several important strengths. To our knowledge, this is the first

study to investigate associations of mental health problems with work stress in terms of both DCS and ERI models in special force police officers while controlling for sociodemographical and occupational variables and personality traits. Such a population has a high exposure to homogenous occupational risks, while many studies include police officers engaged in investigative activities, control of the territory, administrative and office activities and many other very different tasks. The participation rate was very high (99%). Finally, since the measurements used in this study have been validated in several other studies, our results are more comparable with other research findings.

Limitations notwithstanding the present findings indicate that some aspects of psychosocial environment at work, such as the imbalance between effort and reward, are associated with depressive symptoms, anxiety and burnout in special force police officers. Although we could not establish a causal relationship and these results need to be replicated in longitudinal studies, they suggest that the dimensions of the DCS and ERI models can be useful in monitoring psychological functioning of special force police officers.

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Contributors NM, CC and SG conceived the idea of the study and were responsible for the design of the study. NM and CC were responsible for undertaking data analysis and produced the tables and graphs. SG and GC provided input into the data analysis. The initial draft of the manuscript was prepared by NM and CC, and then circulated repeatedly among all authors for critical revision. SG was responsible for the acquisition of the data and carried out medical examinations on workers and GC contributed to the interpretation of the results. All authors read and approved the final version of the manuscript.

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REFERENCES

1. Cherry NM, Chen Y, McDonald JC. Reported incidence and precipitating factors of work-related stress and mental ill-health in the United Kingdom (1996–2001). *Occup Med (Lond)* 2006;56:414–21.
2. Melchior M, Caspi A, Milne BJ, *et al*. Work stress precipitates depression and anxiety in young, working women and men. *Psychol Med* 2007;37:1119–29.

3. Paoli P, Merlié D. *European Foundation for the Improvement of Living and Working Conditions—Third European survey on working conditions*. Luxembourg: Office for Official Publications of the European Communities, 2000.
4. Garbarino S, Chiorri C, Magnavita N, et al. Personality profiles of special force police officers. *J Police Crim Psychol* 2012;27:99–110.
5. Yuan C, Wang Z, Inslicht SS, et al. Protective factors for posttraumatic stress disorder symptoms in a prospective study of police officers. *Psychiatry Res* 2011;188:45–50.
6. Evans R, Pistrang N, Billings J. Police officers' experiences of supportive and unsupportive social interactions following traumatic incidents. *Eur J Psychotraumatol* 2013;4. Epub 15 March 2013 doi:10.3402/ejpt.v4i0.19696
7. Galatzer-Levy IR, Brown AD, Henn-Haase C, et al. Positive and negative emotion prospectively predict trajectories of resilience and distress among high-exposure police officers. *Emotion* 2013;13:545–53.
8. Sanne B, Mykletun A, Dahl A, et al. Testing the job Demand-Control-Support model with anxiety and depression as outcomes: The Hordaland Health Study. *Occup Med (Lond)* 2005;55:463–73.
9. Berg AM, Hem E, Lau B, et al. Stress in the Norwegian police service. *Occup Med (Lond)* 2005;55:113–20.
10. Violanti JM. Police organizational stress: the impact of negative discipline. *Int J Emerg Ment Health* 2011;13:31–6.
11. Garbarino S, Magnavita N, Elovainio M, et al. Police job strain during routine activities and a major event. *Occup Med (Lond)* 2011;61:395–9.
12. McEwen BS. Stress, adaptation and disease. Allostasis and allostatic load. *Ann N Y Acad Sci* 1998;840:33–44.
13. Cooper B. Mental health epidemiology today: a monitor of distress. *Epidemiol Psychiatr Sci* 2012;21:171–3.
14. Winwood PC, Peters R, Peters M, et al. Further validation of the psychological injury risk indicator scale. *J Occup Environ Med* 2012;54:478–84.
15. Summerfield D. Metropolitan Police blues: protracted sickness absence, ill health retirement, and the occupational psychiatrist. *BMJ* 2011;342:d2127.
16. Karasek RA. Job demands, job decision latitude, and mental strain. Implication for job redesign. *Adm Sci Q* 1979;24:285–308.
17. Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol* 1996;1:27–41.
18. Rugulies R, Krause N. Job strain, iso-strain, and the incidence of low back and neck injuries. A 7.5-year prospective study of San Francisco transit operators. *Soc Sci Med* 2005;61:27–39.
19. Magnavita N, Garbarino S. Social psychiatry in the waiting room. What a physician can learn about occupational stress from workers waiting to be examined. *Psychiatry J* 2013;2013:7.
20. Nieuwenhuijsen K, Bruinvels D, Frings-Dresen M. Psychosocial work environment and stress-related disorders, a systematic review. *Occup Med (Lond)* 2010;60:277–86.
21. Marchand A, Blanc ME. The contribution of work and non-work factors to the onset of psychological distress: an eight-year prospective study of a representative sample of employees in Canada. *J Occup Health* 2010;52:176–85.
22. van Rhenen W, van Dijk FJ, Schaufeli WB, et al. Distress or no distress, that's the question: a cutoff point for distress in a working population. *J Occup Med Toxicol* 2008;3:3.
23. van der Klink JJ, van Dijk FJ. Dutch practice guidelines for managing adjustment disorders in occupational and primary health care. *Scand J Work Environ Health* 2003;29:478–87.
24. Iversen A, Dyson C, Smith N, et al. Prevalence of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMEd) project. *Acta Psychiatr Scand Suppl* 2004;420:21–7.
25. Bonde JPE. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. *Occup Environ Med* 2008;65:438–45.
26. Netterström B, Conrad N, Bech P, et al. The relation between work-related psychosocial factors and the development of depression. *Epidemiol Rev* 2008;30:118–32.
27. Violanti JM. *Police Suicide: epidemic in Blue, 2nd ed.*, Charles C. Springfield, IL: Thomas Publisher, 2007.
28. Yoo H, Franke WD. Stress and cardiovascular disease risk in female law enforcement officers. *Int Arch Occup Environ Health* 2011;84:279–86.
29. von dem Knesebeck O, David K, Siegrist J. Psychosocial stress at work and musculoskeletal pain among police officers in special forces. *Gesundheitswesen* 2005;67:674–9.
30. Bourbonnais R, Jauvin N, Dussault J, et al. Psychosocial work environment, interpersonal violence at work and mental health among correctional officers. *Int J Law Psychiatry* 2007;30:355–68.
31. Janzen BL, Muhajarine N, Zhu T, et al. Effort-reward imbalance, overcommitment, and psychological distress in Canadian police officers. *Psychol Rep* 2007;100:525–30.
32. Taris TW, Kompier MAJ, Geurts SAE, et al. Professional efficacy, exhaustion, and work characteristics among police officers: a longitudinal test of the learning-related predictions of the demand-control model. *J Occup Organ Psychol* 2010;83:455–74.
33. Hall GB, Dollard MF, Tuckey MR, et al. Job demands, work-family conflicts, and emotional exhaustion in police officers: a longitudinal test of competing theories. *J Occup Organ Psychol* 2010; 83:237–50.
34. Wang Z, Inslicht SS, Metzler TJ, et al. A prospective study of predictors of depression symptoms in police. *Psychiatry Res* 2010;175:211–16.
35. Garbarino S, Magnavita N, Chiorri C, et al. Evaluation of operational stress in riot and crowd control police units: a global challenge for prevention and management of police task-related stress. *J Police Crim Psychol* 2012;27:111–22.
36. Magnavita N, Garbarino S. Is absence related to work stress? A repeated cross-sectional study on a special police force. *Am J Ind Med* 2013;56:765–75 doi: 10.1002/ajim.22155
37. Garbarino S, Chiorri C, Magnavita N. Personality traits of the five-factor model are associated with work-related stress in special force police officers. *Int Arch Occup Environ Health* 2013 Mar 6 [Epub ahead of print]. doi:10.1007/s00420-013-0861-1
38. Caprara GV, Barbaranelli C, Borgogni L. *BFQ—Big Five Questionnaire: Manuale*. Firenze, Italy: Giunti OS, 1993.
39. Caprara GV, Barbaranelli C, Borgogni L, et al. The Big Five Questionnaire: a new questionnaire to assess the five factor model. *Pers Individ Dif* 1993;15:281–8.
40. Magnavita N. Two tools for health surveillance of job stress: the Karasek Job Content Questionnaire and the Siegrist Effort Reward Imbalance Questionnaire. *G Ital Med Lav Ergon* 2007;29:667–70.
41. Courvoisier DS, Perneger TV. Validation of alternative formulations of job strain. *J Occup Health* 2010;52:5–13.
42. Juniper B, White N, Bellamy P. A new approach to evaluating the well-being of police. *Occup Med (Lond)* 2010;60:560–5.
43. Beck AT, Rush AJ, Shaw BF, et al. *Cognitive therapy of depression*. New York: Guilford Press, 1979.
44. Bunevicius A, Staniute M, Brozaitiene J, et al. Evaluation of depressive symptoms in patients with coronary artery disease using the Montgomery Åsberg Depression Rating Scale. *Int Clin Psychopharmacol* 2012;27:249–55.
45. Preljevic VT, Osthus TB, Sandvik L, et al. Screening for anxiety and depression in dialysis patients: Comparison of the Hospital Anxiety and Depression Scale and the Beck Depression Inventory. *J Psychosom Res* 2012;73:139–44.
46. Adachi Y, Aleksic B, Nobata R, et al. Combination use of Beck Depression Inventory and two-question case-finding instrument as a screening tool for depression in the workplace. *BMJ Open* 2012;2: e000596.
47. Spielberger CD, Gorsuch RL, Lushene RE, et al. *The state-trait anxiety inventory for adults*. Manual. Palo Alto, CA: Mind Garden, 1983.
48. Sanavio E, Bertolotti G, Michielin P, et al. *CBA-2.0. Cognitive behavioural assessment 2.0. Scale primarie*. Firenze: Giunti OS, 1997.
49. Maslach C, Jackson SE. The measurement of experienced burnout. *J Occup Behav* 1981;2:99–113.
50. Sirigatti S, Stefanile C. *MBI. Maslach Burnout Inventory. Adattamento italiano*. Firenze: Giunti OS, 1993.
51. Violante S, Benso PG, Gerbaudo L, et al. Relationship between job satisfaction, and stress, burnout and psychosocial factors among nurses working in different health settings. *G Ital Med Lav Ergon* 2009;31:A36–44.
52. Lahey BB. Public health significance of neuroticism. *Am Psychol* 2009;64:241–56.
53. Ozer DJ, Benet-Martínez V. Personality and the prediction of consequential outcomes. *Annu Rev Psychol* 2006;57:401–21.
54. Stansfeld S, Candy B. Psychosocial work environment and mental health—a meta-analytic review. *Scand J Work Environ Health* 2006;32:443–62.
55. Eshel N, Roiser JP. Reward and punishment processing in depression. *Biol Psych* 2010;68:118–24.
56. Griffin JM, Greiner BA, Stansfeld SA, et al. The effect of self-reported and observed job conditions on depression and anxiety symptoms: a comparison of theoretical models. *J Occup Health Psych* 2007;12:334–49.
57. Chen SW, Wang PC, Hsin PL, et al. Job stress models, depressive disorders and work performance of engineers in microelectronics industry. *Int Arch Occup Environ Health* 2011;84:91–103.

58. Martins LCX, Lopes CS. Military hierarchy, job stress and mental health in peacetime. *Occup Med (Lond)* 2012;62:182–7.
59. Kingdom SE, Smith AP. Combined effects of work-related stress in Her Majesty's Coastguard (HMCG). *Int Marit Health* 2012;63:63–70.
60. Berg AM, Hem E, Lau B, *et al.* An exploration of job stress and health in the Norwegian police service: a cross sectional study. *J Occup Med Toxicol* 2006;1:26.
61. Arial M, Gonik V, Wild P, *et al.* Association of work related chronic stressors and psychiatric symptoms in a Swiss sample of police officers; a cross sectional questionnaire study. *Int Arch Occup Environ Health* 2010;83:323–31.
62. Fox J, Desai MM, Britten K, *et al.* Mental-health conditions, barriers to care, and productivity loss among officers in an urban police department. *Conn Med* 2012;76:525–31.
63. Frühwald S, Entenfellner A, Grill W, *et al.* Raising awareness about depression together with service users and relatives—results of workshops for police officers in Lower Austria. *Neuropsychiatr* 2011;25:183–91.
64. Obidoa C, Reeves D, Warren N, *et al.* Depression and work family conflict among corrections officers. *J Occup Environ Med* 2011;53:1294–301.
65. Pflanz SE, Ogle AD. Job stress, depression, work performance, and perceptions of supervisors in military personnel. *Mil Med* 2006;171:861–5.
66. van der Velden PG, Rademaker AR, Vermetten E, *et al.* Police officers: a high-risk group for the development of mental health disturbances? A cohort study. *BMJ Open* 2013;3:e001720.
67. Lee YM. Loss of productivity due to depression among Korean employees. *J Occup Health* 2010;52:389–94.
68. Berking M, Meier C, Wupperman P. Enhancing emotion-regulation skills in police officers: results of a pilot controlled study. *Behav Ther* 2010;41:329–39.