

# Work and social functioning in frontline healthcare workers during the covid-19 pandemic in Italy: role of acute post-traumatic stress, depressive and anxiety symptoms

## *Funzionamento socio-lavorativo negli operatori sanitari in prima linea durante la pandemia da covid-19 in Italia: ruolo dei sintomi post-traumatici da stress acuti, depressivi e ansiosi*

CLAUDIA CARMASSI<sup>1</sup>, VIRGINIA PEDRINELLI<sup>1\*</sup>, VALERIO DELL'OSTE<sup>1,2</sup>,  
CARLO ANTONIO BERTELLONI<sup>1</sup>, ANNALISA CORDONE<sup>1</sup>, SIHAM BOUANANI<sup>3</sup>, MARTINA CORSI<sup>4</sup>,  
SIGRID BALDANZI<sup>4</sup>, PAOLO MALACARNE<sup>5</sup>, LILIANA DELL'OSSO<sup>1</sup>, RODOLFO BUSELLI<sup>4</sup>

\*E-mail: virginiapedrinelli@gmail.com

<sup>1</sup>Department of Clinical and Experimental Medicine, University of Pisa, Pisa, Italy

<sup>2</sup>Department of Biotechnology, Chemistry and Pharmacy, University of Siena, Siena, Italy

<sup>3</sup>Department of Mental Health and Addictions, Azienda USL Toscana Nord-Ovest, Lucca, Italy

<sup>4</sup>Department of Occupational Health, Azienda Ospedaliero-Universitaria Pisana, Pisa, Italy

<sup>5</sup>Anaesthesia and Intensive Care Unit, Azienda Ospedaliero-Universitaria Pisana, Pisa, Italy

**SUMMARY. Background.** Evidence highlights healthcare workers (HCWs) facing outbreaks, particularly the ongoing covid-19 pandemic, are at increased risk of negative mental health outcomes, particularly post-traumatic stress symptoms (PTSS), anxiety and depression. Data from previous outbreaks highlighted the risk for a negative impact on HCWs' social and occupational functioning, but scant data have investigated this issue in the framework of the covid-19 pandemic. A number of effective interventions have been proposed to support mental health and well-being of HCWs in emerging infectious outbreaks, but it is important to acknowledge the differential impact of mental disorders on different dimensions of functioning. **Methods.** The study explored the associations between work and social functioning and PTSS, depression and anxiety in a sample of 265 frontline HCWs employed at a major university hospital in Italy (Pisa), facing the first period of the covid-19 pandemic. Individuals were assessed by means of the Impact of Event Scale-Revised (IES-R) for PTSS, the Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms, the General Anxiety Disorder-7 Item (GAD-7) for anxiety symptoms and the Work and Social Adjustment Scale (WSAS) to assess work and social functioning. **Results.** Higher levels of functioning impairment were found among individuals with moderate to severe acute PTSS, depressive and anxiety symptoms with respect to those without. Acute PTSS and depressive symptoms were predictive factors of impairment in each domain of functioning analyzed. Anxiety symptoms were associated with impairment in both work and home management activities. Frontline activity was associated with impairment in both private and social leisure activities. **Conclusions.** Long-term perspective studies are warranted to better investigate the psychopathological burden on HCWs' work and social functioning and to promote adequate intervention strategies.

**KEY WORDS:** health care workers, work and social functioning, functioning, post-traumatic stress symptoms, post-traumatic stress reactions, stress, anxiety, depression, covid-19, SARS-CoV-2, pandemic.

**RIASSUNTO. Introduzione.** Gli operatori sanitari impegnati durante un'epidemia, come l'attuale pandemia da covid-19, presentano un elevato rischio di sviluppare effetti negativi sulla salute mentale, tra i quali sintomi da stress post-traumatico (Post-Traumatic Stress Symptoms - PTSS), ansia e depressione. Evidenze dai precedenti eventi epidemici hanno sottolineato un impatto negativo sul funzionamento sociale e lavorativo del personale sanitario, tuttavia i dati relativi al contesto della pandemia da covid-19 sono scarsi. Inoltre, sono stati proposti una serie di interventi a supporto della salute mentale e del benessere degli operatori sanitari durante eventi epidemici, ma a tal fine è importante riconoscere l'impatto differenziale della psicopatologia sulle specifiche dimensioni del funzionamento. **Metodi.** Lo studio ha indagato le associazioni tra funzionamento socio-lavorativo e PTSS, depressione e ansia in un campione di 265 operatori sanitari impegnati nella fase acuta della pandemia da covid-19 presso un ospedale universitario in Italia. I soggetti sono stati valutati mediante la Impact of Event Scale-Revised (IES-R) per i PTSS, il Patient Health Questionnaire-9 (PHQ-9) per i sintomi depressivi, la General Anxiety Disorder-7 Item (GAD-7) per i sintomi ansiosi e la Work and Social Adjustment Scale (WSAS) per valutare il funzionamento sociale e lavorativo. **Risultati.** Maggiore compromissione del funzionamento socio-lavorativo è stata riscontrata nei soggetti con PTSS acuti, sintomi depressivi e sintomi ansiosi di grado moderato-severo. I sintomi depressivi e i PTSS acuti si sono rivelati fattori predittivi di compromissione in ciascuno dei domini del funzionamento analizzati, mentre l'attività in prima linea è risultata associata con una compromissione delle attività ricreative sia personali che sociali. **Conclusioni.** Sono necessari ulteriori studi a lungo termine per valutare l'impatto della psicopatologia sul funzionamento socio-lavorativo degli operatori sanitari e per promuovere adeguate strategie di intervento.

**PAROLE CHIAVE:** operatori sanitari, funzionamento sociale e lavorativo, funzionamento, sintomi post-traumatici da stress, reazioni post-traumatiche da stress, stress, ansia, depressione, covid-19, SARS-CoV-2, pandemia.

## INTRODUCTION

The Coronavirus Disease-19 (covid-19) outbreak spread out rapidly and unexpectedly across countries, since the first reports of a cluster of novel viral pneumonia in Wuhan (China) in December 2019, catching off guard healthcare systems worldwide, with Italy being the first European Country being involved. In a few weeks the covid-19 infection spread, causing excessive hospital overcrowding and high workload for first line health care professionals across the great majority of countries affected<sup>1,2</sup>. Previous viral outbreaks showed that healthcare workers (HCWs) are at increased risk of infection and other physical adverse outcomes<sup>3-5</sup>. Furthermore, HCWs were shown to be at increased risk of negative mental health outcomes, reporting a wide range of psychopathological sequelae, among which post-traumatic stress symptoms (PTSS), anxiety and depression during and after the epidemics<sup>3,6-8</sup>. Likewise, some evidence has already emerged in the framework of the current covid-19 global health crisis, with HCWs involved in frontline and non-frontline activities showing several adverse psychological effects<sup>9-13</sup>.

Working during or after an outbreak of an infectious disease with a real or potential overwhelm of sanitary system may have a severe impact on the maintenance of a functional workforce and the WHO has immediately drawn attention on the high burden on HCWs due to the current emergency, calling for action to plan fast and adequate measures both to save lives and to prevent serious consequences on physical and mental health of HCWs<sup>14</sup> and, consequently, on their impact on work and social functioning. There are many potential factors described in the current literature contributing for such high mental toll for HCWs: first of all the concern of infection for themselves and their relatives because of their frontline work with patients with high viral loads, as well as the inadequate personal protection equipments and the lack of specific guidelines for effective treatments<sup>15-18</sup>. In parallel, common psychosocial factors affecting mental health and well-being of HCWs during epidemics include changes in job routine with a heavier workload, learning new technical skills, lack of effective support in the working environment, guilt feelings, uncertainty about the future<sup>19-21</sup>.

The covid-19 pandemic suddenly disrupted HCWs daily routine forcing personnel to adapt in response to new measures and restrictions, with these changes having pervasive impact on health and wellbeing and a significant effect on every domain of human functioning<sup>22,23</sup>. Despite findings on previous coronavirus outbreaks (e.g. SARS or MERS) first highlighted the risk for a negative impact on work and social functioning in the general population with many sources reflecting the additional burden for professionals<sup>6,24</sup>, still scant data have deeply investigated this issue in the framework of the covid-19 pandemic<sup>25</sup>. First reports highlighted a major impact may be due to ethical tensions concerning inability to reach previous levels of service, dealing with management challenges, balancing exposure with social contact<sup>26,27</sup>. These burdens were described as growing over time, with female HCWs, frontline and closer to the outbreaks workers being at higher risk of psychiatric sequelae and higher functional impairment<sup>21,27,28</sup>.

Most of the cross-sectional studies on HCWs facing the covid-19 pandemic revealed a considerable proportion of participants reporting symptoms of depression, anxiety, in-

somnia and acute post-traumatic stress symptoms<sup>29-31</sup>. A recent meta-analysis on impact of viral epidemic outbreaks on mental health of HCWs, including covid-19 outbreak on 117 studied<sup>32</sup>, reported a pooled prevalence higher for Acute Stress Disorder (40%), followed by anxiety (30%), depression (24%) and post-traumatic stress disorder (PTSD, 13%), with some psychosocial (e.g. female gender and younger age, lack of social support, stigmatization) and occupational factors (e.g. frontline activity, working in a high risk environment, lower levels of specialized training and job experience) being associated with the likelihood of developing those problems. Irrespective of the current context, the psychological burden and overall wellness of HCWs received increasing awareness in the last decade, with research continuing to show high rates of stress, depressive and anxiety symptoms, impacting negatively on their work and social functioning abilities<sup>33-35</sup>. However, scant data are still available to understand the burden of negative mental health outcomes on work and social functioning of HCWs. Despite a number of effective interventions were indeed proposed and recommended to support mental health and well-being of HCWs and to reduce psychological distress abilities in emerging disease outbreaks (e.g. professional counselling or psychological services, clear work communication, adequate rest, peer and family support, avoidance of harmful coping strategies such as alcohol and drugs)<sup>4,23,36</sup>, it is important to acknowledge the possible differential impact of the mental illnesses on the different dimensions of functioning to identify most effective interventions.

The definitions of 'functioning' within the literature are diverse and a comprehensive picture is not always presented. The concept remains vague and overlapping terms are often used, such as psychosocial adjustment, social functioning and functioning impairment<sup>37-39</sup>. Bosc<sup>40</sup> defined "social functioning" as the interaction of individuals with their environment and the ability to fulfill their role with their environment; environments with which every person daily interacts are several: work, social and leisure, marital, parental and with the extended family. We aimed at assessing functioning of HCWs employed in covid-19 inpatient wards at the peak of pandemic considering both work and social functioning as additional factors to give us a broader scope of mental state of exposed personnel.

In this regard, aim of the present study was to investigate the differential impact of acute post-traumatic stress, depressive and anxiety symptoms on dimensions of functioning in a sample of HCWs employed in a University Hospital in Italy during the acute phase of covid-19 outbreak.

## METHODS

### Study sample and procedures

A consecutive sample of 265 HCWs, employed at a major University Hospital in central Italy (Azienda Ospedaliero-Universitaria Pisana, AOUP, Pisa, Italy) during the covid-19 pandemic, were consecutively enrolled for the present study. The recruitment was conducted during the acute phase of the covid-19 emergency (between April 1<sup>st</sup> and May 1<sup>st</sup> 2020) at the outpatient service of the Occupational Health Department of the AOUP,

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specifically dedicated to assess and manage the physical and mental health of the staff in the framework of the covid-19 emergency. All HCWs enrolled experienced work-related traumatic events related to the management of patients hospitalized because of the covid-19. Inclusion criteria included being employed in the AOUP during the covid-19 pandemic and being exposed to multiple patients' death in the framework of the outbreak emergency. Subjects with poor knowledge of the Italian language or other limits to verbal communication were excluded from the study.

The referred subjects were assessed by means of some questionnaires: the Impact of Event Scale-Revised (IES-R) for PTSS, the Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms, the General Anxiety Disorder-7 Item (GAD-7) for anxiety symptoms and the Work and Social Adjustment Scale (WSAS) to assess work and social functioning.

Suitable candidates were asked to provide written informed consent after receiving a complete description of the study and they had the opportunity to ask questions. The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Area Vasta Nord-Ovest Toscana (Pisa, Italy, protocol study n° 2020/17151).

### **Measures**

#### *The Impact of Event Scale- Revised (IES-R)*

The IES-R is a 22-item scale measuring three core symptoms of PTSD, i.e., re-experiencing of traumatic events, defensive avoidance and denial of trauma related memories and emotions<sup>41</sup>. It refers to the last week. The questionnaire has an adequate internal consistency ( $\alpha=0.80-0.93$  for the intrusion;  $\alpha=0.73-0.84$  for avoidance), and high test-retest reliability ( $r=0.93$ ). A score over 24 represents a cutoff for the presence of moderate to severe PTSS. The questionnaire has adequate internal consistency, and high test-retest reliability ( $r=0.93$ ). In accordance with the aim of the study, the items referred to the experiences in the framework of work duties during the covid-19 emergency.

#### *The Patient Health Questionnaire (PHQ-9)*

PHQ-9 is a 9-item self-administered scale measuring depressive symptoms severity in the last two weeks on a 4-point scale from 0=*not at all* to 3=*nearly every day*, with the total score ranging from 0 to 27<sup>42</sup>. A cutoff score of 10 has been shown to have a sensitivity of 88% and a specificity of 88% specificity for major depression. The test has adequate internal consistency (Cronbach's  $\alpha=0.89$ ) and excellent test-retest reliability ( $r=0.84$ ).

#### *The Generalized Anxiety Disorder 7-Item (GAD-7)*

The GAD-7 is a self-assessment questionnaire used as a tool for screening and measuring the severity of anxiety symptoms<sup>43</sup>. Particularly, it investigates the frequency of anxious symptoms in the last two weeks using 7-items with a score ranging from 0=*never* to 3=*almost every day*. The internal consistency of the GAD-7 is excellent (Cronbach's  $\alpha=0.92$ ) and test-retest reliability is also good ( $r=0.83$ ). Scores over 10 suggest the presence of moderate to severe anxiety symptoms.

#### *Work and Social Adjustment Scale (WSAS)*

The WSAS is a test used to evaluate and measure the work and social adjustment<sup>44</sup>. It includes five items that assess the individual's ability to perform the activities of everyday life and how these are affected in the week prior to the assessment. The first item investigates the work ability of the subject. The second item assesses the ability to cope with household chores such as cleaning the house, looking after the children, and doing shopping. The third item assesses private recreational activities carried out by the patient, such as going to the cinema, visiting museums, and reading. The fourth and fifth items investigate the family interaction and relationship: in particular, the fourth item investigates the social activities carried out exclusively with people who are not part of the family and includes activities such as parties, tours of pleasure, going clubbing, or going on romantic dates. The fifth item analyzes only the relations with family members with whom the person lives, and whether any problems of the subject under examination have interfered with this type of relationship. Each of the five items is rated on a nine-point scale ranging from 0 (not at all) to 8 (severe interference), so that the total scores are between 0 and 40. The internal consistency of the instrument varies from 0.70 to 0.94 (Cronbach's alpha) and the reliability of the test-retest is 0.73.

### **Statistical analyses**

All statistical analyses were performed using the Statistical Package for Social Science, version 25.0 (SPSS Inc.). Continuous variables were reported as mean  $\pm$  standard deviation (SD), whereas categorical variables were reported as percentages. All tests were two-tailed and a p value  $<.05$  was considered statistically significant.

Mann-Whitney test was used to correlate WSAS scores and socio-demographical characteristics of the sample and to compare WSAS scores between individuals with and without PTSS, depressive and anxiety symptoms.

Five multiple linear regression models (one for each item of WSAS questionnaire) were performed to identify strongest predictors of work and social functioning impairment among socio-demographic and clinical characteristics in the sample.

## **RESULTS**

The total sample included 265 HCWs, 84 (31.7%) males and 181 (68.3%) females and it was composed by 85 (32.1%) physicians, 133 (50.2%) nurses and 47 (17.7%) healthcare assistants. Among them, 51 (19.2%) HCWs were newly employed (less than 12 months) and 117 (44.2%) had a front-line activity in the management of covid-19 patients. The mean age in the total sample was  $40.43 \pm 11.20$  years.

Regarding clinical characteristics, each WSAS item mean score resulted significantly higher among individuals with acute PTSS, depressive and anxiety symptoms respect to those without (Table 1). Likewise, WSAS total mean score was significantly higher among HCWs with acute PTSS compared to those without ( $18.2 \pm 9.2$  versus  $8.5 \pm 8.6$ ,  $p < .001$ ), as well as among those with depressive symptoms with respect to those without ( $23.1 \pm 8.5$  versus  $9.3 \pm 8.6$ ,  $p < .001$ ) and among individuals reporting anxiety symptoms compared to

Table 1. WSAS scores (mean±SD) in the total sample and divided by HCWs' socio-demographic and clinical characteristics.

	N (%)	WSAS 1 Working activities	p	WSAS 2 Household chores	p	WSAS 3 Recreational activities	p	WSAS 4 Social activities	p	WSAS 5 Family relationships	p
<b>Total sample</b>	265 (100)	1.7±1.9	-	1.4±1.8	-	2.3±2.4	-	2.7±2.8	-	2.3±2.4	-
<b>Males</b>	84 (31.7)	1.6±1.8	.619	1.3±1.6	.892	2.3±2.4	.684	3.0±2.8	.265	2.0±2.3	.348
<b>Females</b>	181 (61.3)	1.8±2.0		1.5±1.9		2.3±2.4		2.6±2.8		2.4±2.5	
<b>Physicians</b>	85 (32.1)	1.7±1.8	.880	1.2±1.6	.317	2.5±2.4	.131	3.2±2.8	.068	2.1±2.4	.735
<b>Other HCWs</b>	180 (67.9)	1.8±1.9		1.5±1.9		2.2±2.4		2.5±2.8		2.3±2.1	
<b>Hospital duty &lt;1 year</b>	51 (19.2)	1.9±1.9	<b>.008</b>	1.6±1.9	<b>.006</b>	2.5±2.4	<b>.003</b>	2.9±2.8	<b>.024</b>	2.4±2.5	.089
<b>Hospital duty &gt;1 year</b>	214 (80.8)	1.2±1.6		0.8±1.2		1.4±1.9		2.0±2.6		1.8±2.3	
<b>Firstline staff</b>	117 (44.2)	1.8±1.8	.729	1.5±1.9	.765	2.5±2.7	.484	3.1±2.9	.128	2.5±2.6	.344
<b>No-firstline staff</b>	148 (55.2)	1.7±2.0		1.4±1.7		2.1±2.1		2.5±2.7		2.1±2.2	
<b>ICU staff</b>	78 (29.4)	1.6±1.7	.499	1.2±1.8	.138	2.2±2.5	.268	2.8±2.8	.894	2.2±2.6	.651
<b>No ICU staff</b>	187 (70.6)	1.8±2.0		1.5±1.8		2.3±2.3		2.7±2.8		2.3±2.4	
<b>PTSS</b>	47 (17.7)	3.0±2.0	<b>&lt;.001</b>	2.8±2.2	<b>&lt;.001</b>	3.8±2.7	<b>&lt;.001</b>	4.4±2.8	<b>&lt;.001</b>	4.0±2.2	<b>&lt;.001</b>
<b>No PTSS</b>	218 (82.3)	1.4±1.7		1.0±1.5		1.8±2.1		2.4±2.7		1.8±2.3	
<b>Depression</b>	24 (9.1)	3.8±2.2	<b>&lt;.001</b>	3.9±2.2	<b>&lt;.001</b>	4.7±1.9	<b>&lt;.001</b>	5.3±2.4	<b>&lt;.001</b>	5.0±2.0	<b>&lt;.001</b>
<b>No Depression</b>	241 (90.9)	1.5±1.7		1.2±1.5		2.0±2.3		2.5±2.7		2.0±2.3	
<b>Anxiety</b>	36 (13.6)	3.8±2.3	<b>&lt;.001</b>	3.6±2.2	<b>&lt;.001</b>	4.2±2.5	<b>&lt;.001</b>	4.4±2.6	<b>&lt;.001</b>	4.5±2.3	<b>&lt;.001</b>
<b>No Anxiety</b>	229 (86.4)	1.4±1.6		1.1±1.4		2.0±2.2		2.5±2.7		1.9±2.2	

those who did not report them (20.5±9.8 versus 8.9±8.3, p=<.001).

Further, the analysis of socio-demographic characteristics revealed that the mean scores of WSAS single items (except for item 5) were significantly higher among newly employed HCWs as compared to the ones with a hospital duty time over one year (Table 1). Similarly, investigating the relationships between socio-demographic characteristics and WSAS total mean score in the sample, no significant differences emerged except for hospital duty time, with subjects employed for less than one year reporting higher mean scores with respect to those hired for over one year (11.2±9.5 versus 7.3±8.4, p=.005).

Five linear regression models were performed, considering sociodemographic characteristics (age, gender, front-line activity, being newly employed, physician role), in addition to PHQ-9, GAD-7 and IES-R total scores as independent variables and the scores of each WSAS item as dependent variables. Results showed: age, IES-R, GAD-7 and PHQ-9 total scores presented a significant positive association with WSAS item 1 (working activities) (Table 2); PHQ-9, GAD-7 and IES-R total scores presented a significant positive association with WSAS item 2 (home management) (Table 3); front-line activity, IES-R and PHQ-9 total scores presented a

Table 2. Demographic, occupational and psychopathological factors associated with functional impairment (WSAS item 1 working activities) in HCWs during covid-19 pandemic.

Predictive factors	b (S.E.)	β	CI95%	p
K	-0.279 (.590)	-	-0.883-1.441	.636
<b>Age</b>	<b>.018 (.010)</b>	<b>.107</b>	<b>-.002-.038</b>	<b>.038</b>
Gender	-0.097 (.216)	-.024	-.523-.328	.653
Frontline	-0.023 (.292)	-.006	-.598-.552	.938
New employed	-0.179 (.297)	-.037	-.763-.405	.547
Medical doctor	-0.245 (.222)	-.060	-.682-.192	.271
ICU staff	-0.025 (.327)	-.006	-.669-.619	.939
<b>PHQ-9</b>	<b>.052 (.020)</b>	<b>.177</b>	<b>.014-.091</b>	<b>.008</b>
<b>GAD-7</b>	<b>.109 (.033)</b>	<b>.262</b>	<b>.044-.173</b>	<b>.001</b>
<b>IES-R</b>	<b>.021 (.007)</b>	<b>.213</b>	<b>.008-.035</b>	<b>.002</b>

*r*<sup>2</sup> = 0.324; adjusted *r*<sup>2</sup> = 0.301



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Table 3. Demographic, occupational and psychopathological factors associated with functional impairment (WSAS item 2 household chores) in HCWs during covid-19 pandemic.

Predictive factors	b (S.E.)	β	CI95%	p
K	.425 (.533)	-	-.624-.1474	.426
Age	.014 (.009)	.085	-.004-.031	.139
Gender	-.193 (.195)	-.050	-.577-0.191	.324
Frontline	.067 (.264)	.019	-.452-.586	.799
New employed	-.324 (.268)	-.073	-.861-.194	.214
<b>Medical doctor</b>	<b>-.526 (.200)</b>	<b>-.137</b>	<b>-.921- -.159</b>	<b>.009</b>
ICU staff	-.168 (.295)	-.073	-.861-.194	.799
<b>PHQ-9</b>	<b>.064 (.018)</b>	<b>.228</b>	<b>.029-.098</b>	<b>.000</b>
<b>GAD-7</b>	<b>.088 (.029)</b>	<b>.226</b>	<b>.030-.146</b>	<b>.003</b>
<b>IES-R</b>	<b>.024 (.006)</b>	<b>.249</b>	<b>.012-.036</b>	<b>.000</b>

$r^2 = .383$ ; adjusted  $r^2 = .361$

Table 5. Demographic, occupational and psychopathological factors associated with functional impairment (WSAS item 4 social activities) in HCWs during covid-19 pandemic.

Predictive factors	b (S.E.)	β	CI95%	p
K	1.318(.910)	-	-.474-3.110	.149
Age	.022(.016)	.092	-.009-.053	.160
Gender	-.491(.333)	-.085	-1.147-.165	.142
<b>Frontline</b>	<b>.912(.450)</b>	<b>.169</b>	<b>.026-1.799</b>	<b>.044</b>
New employed	-.120(.457)	-.018	-1.021-.780	.793
Medical doctor	.471(.342)	.082	-.202-1.145	.170
ICU staff	-.440(.504)	-.075	-1.433-.554	.384
<b>PHQ-9</b>	<b>.078(.030)</b>	<b>.186</b>	<b>.018-.137</b>	<b>.011</b>
GAD-7	.003(.050)	.004	-.096-.102	.958
<b>IES-R</b>	<b>.039(.010)</b>	<b>.272</b>	<b>.018-.059</b>	<b>.000</b>

$r^2 = .200$ ; adjusted  $r^2 = .171$

significant positive association with WSAS item 3 (private leisure activities) (Table 4) and with WSAS item 4 (social activities) (Table 5); finally, PHQ-9 and IES-R total scores presented a significant positive association with WSAS item 5 (family relationships) (Table 6).

DISCUSSION

To the best of our knowledge, this is the first study investigating the different impact of socio-demographic and clinical variables on functional impairment in HCWs facing the acute phase of the covid-19 pandemic in Italy.

Table 4. Demographic, occupational and psychopathological factors associated with functional impairment (WSAS item 3 private recreational activities) in HCWs during covid-19 pandemic.

Predictive factors	b (S.E.)	β	CI95%	p
K	1.086 (.764)	-	-.420-2.591	.157
Age	.011 (.013)	.051	-.015-.036	.415
Gender	-.275 (.280)	-.055	-.826-.276	.327
<b>Frontline</b>	<b>.850 (.378)</b>	<b>.180</b>	<b>.105-1.595</b>	<b>.025</b>
New employed	-.463 (.384)	-.078	-1.219-.294	.230
Medical doctor	.204 (.287)	.040	-.363-.770	.480
ICU staff	-.564 (.424)	-.110	-1.399-.270	.184
<b>PHQ-9</b>	<b>.065 (.025)</b>	<b>.176</b>	<b>.015-.115</b>	<b>.015</b>
GAD-7	.072 (.042)	.141	-.011-0.155	.088
<b>IES-R</b>	<b>.029 (.009)</b>	<b>.230</b>	<b>.011-.046</b>	<b>.001</b>

$r^2 = .261$ ; adjusted  $r^2 = .235$

Table 6. Demographic, occupational and psychopathological factors associated with functional impairment (WSAS item 5 family relationships) in HCWs during covid-19 pandemic.

Predictive factors	b (S.E.)	β	CI95%	p
K	.591(.790)	-	-.964-2.147	.455
Age	.012(.014)	.056	-.015-.039	.375
Gender	.020(.289)	.004	-.549-.590	.945
Frontline	.447(.391)	.092	-.323-1.261	.254
New employed	-.168(.397)	-.028	-.950-.614	.672
Medical doctor	-.212(.297)	-.041	-.797-.373	.476
ICU staff	-.231(.438)	-.044	-1.093-.631	.598
<b>PHQ-9</b>	<b>.059(.026)</b>	<b>.158</b>	<b>.008-.111</b>	<b>.025</b>
GAD-7	.071(.044)	.136	-.014-.157	.103
<b>IES-R</b>	<b>.035(.009)</b>	<b>.276</b>	<b>.017-.053</b>	<b>.000</b>

$r^2 = .250$ ; adjusted  $r^2 = .223$

Comparing WSAS total and single item mean scores in the total sample and divided by socio-demographic characteristics, newly employed HCWs showed higher scores with respect to those with a hospital duty time over one year. Many evidences pointed out that lower levels of specialized training as well as the lack of professional experience and younger age (often combined with previous ones) were associated with higher risk of psychological effects among which higher rates of PTSS, depressive and anxiety symptoms among HCWs during previous and current disease outbreaks<sup>3,8,31,45</sup>. Despite the lack of evidence, we argue that a limited professional training – especially in a complex sce-

nario as the one determined by a pandemic condition – may determinate a higher burden on HCWs work and social functioning, particularly for newly employed ones rather than for healthcare staff with a longer professional experience.

Our results showed clinical characteristics of the sample having the highest impact on work and social functioning. Particularly, HCWs with moderate to severe acute PTSS, depressive and anxiety symptoms reported statistically significant higher WSAS total and each item mean scores with respect to those without, revealing the burden of such psychopathological symptoms on global functioning impairment. Increasing evidence highlighted the risk for HCWs during and after disease outbreaks for negative mental health outcomes with high prevalence of PTSS, depressive and anxiety symptoms and other psychological issues, suggesting the need to establish ways to mitigate mental health risks and adjust interventions under epidemic and pandemic conditions<sup>23,34,46,47</sup>, despite little has been reported on the specific impact on work and social functioning.

Acute PTSS resulted positively correlated with impairment in all different dimensions of functioning analyzed. These findings are in line with previous research, showing acute stress reactions and PTSD were related to maladjusted work and social functioning. Most studies are focused on veterans, revealing PTSD related to negative impact on psychosocial adjustment, with an increased risk for developing subsequent global functioning impairment<sup>34,48,49</sup>. Further, it is not unusual for individuals with subthreshold post-traumatic stress reactions to demonstrate significant disability<sup>50</sup>. In a sample of over 200 of treatment-seeking psychiatric patients, Zlotnick et al.<sup>51</sup> showed that subthreshold PTSD is associated with levels of social and work morbidity comparable to full PTSD. In two independent community surveys on more than 1600 individuals, the presence of two re-experiencing symptoms and the presence of one additional symptom of PTSD was found to be a valid limited symptom set associated to work and social impairment to profile post-traumatic functional impairment<sup>52</sup>. On a sample of HCWs working in an Emergency department of a major University Hospital in Italy, some of us reported significant correlations between PTSD symptoms and WSAS total mean score, showing that emergency workers to be at risk for both PTSD symptoms and related work and social impairment, particularly among women and non-graduated subjects<sup>53</sup>. Further, a study on 137 emergency HCWs revealed a PTSD rate of 14,3%; subjects with PTSD reported significantly higher work and social functioning impairment compared to those without<sup>54</sup>.

Results also showed the burden of depressive symptoms on HCWs functioning, the latter being predictive factors of impairment in every dimension of functioning analyzed. Depression is a very common mental illness that diminishes quality of life and in which emotional, somatic and functional impairments are included among the main features of Major Depressive Disorder<sup>55</sup>. Functional impairment related to depression results in both occupational and social impairments that upset working abilities, social and private leisure activities, family life and responsibilities and interpersonal relationships<sup>56,57</sup>. Many studies highlighted the effect of exposure to extreme stress on hospital personnel with a considerable proportion of HCWs experiencing mood disturbances and stressing the need to establish ways to mitigate mental health risks among this working class<sup>29,47,58,59</sup>, but

studies that investigated the impact of depressive symptoms on functioning among HCWs are scarce<sup>60</sup>. In a repeated cross-sectional study, for instance, Ben-Ezra et al.<sup>61</sup> compared depressive and PTSS and psychosocial functioning among exposed and non-exposed HCWs during the Gaza war and six months later finding that compared to unexposed hospital personnel, exposed hospital personnel had significantly higher level of depressive and post-traumatic stress symptoms and higher psychosocial functioning impairment. Xiao et al.<sup>62</sup>, investigating over 900 HCWs at the peak of covid-19 pandemic in China, revealed that more than 53% of professionals had symptoms of depression, with independent risk factors represented by gender, different job titles, protective support and contact history, suggesting interventions to prevent work and social functioning impairment in this working class.

The finding of the present study indicating anxiety symptoms as predictive factors for functioning impairment of HCWs, with a positive association with WSAS total mean score and with impairment in both working and home management activities, was in line with the literature. Among clinical and community samples, anxiety disorders were in general associated with a significant dissatisfaction in work and overall social adjustment of individuals affected, with a significant impact on functioning, occupational role and work productivity, poor interpersonal relations, family and social life related to a lower quality of life than any non-anxious control sample<sup>63-65</sup>. Evidence from previous outbreaks, along with evidence from the current covid-19 pandemic, pointed out high rates of anxiety symptoms among HCWs and many target interventions have been proposed to support mental health of frontline health professionals, but there is little data in literature about the burden of anxiety symptoms on psychosocial functioning among healthcare staff. Korkmaz et al.<sup>66</sup> in a sample of 140 HCWs involved in covid-19 patients care found that 33% of the participants reported clinically significant anxiety symptoms: anxiety levels were negatively correlated to quality of life and problem-solving skills, showing that such symptoms could affect the problem-solving skills of HCWs with an impairment of their working and social abilities to cope with such crisis and cause a deterioration of their quality of life.

Noteworthy, in the present study frontline activity was positively associated with impairment in social functioning, with reported impairment in both private and social leisure activities. Frontline HCWs, being employed in high-risk departments, such as Intensive Care Units and respiratory wards, have the highest exposure risk and most studies evidenced direct exposure to covid-19 patients as one of the most common risk factor for negative mental health outcomes among health personnel in the current pandemic<sup>29,67</sup>, with significantly higher levels of post-traumatic stress, depression and anxiety symptoms and other psychological issues among frontline HCWs with respect to non-frontline HCWs<sup>11,29,68</sup>. Reasons for such high toll may be several: first, frontline HCWs, beyond having the most exposure risk, directly see the effects of covid-19 on patients and the reported unpredictable nature of deterioration and the high mortality and morbidity associated with the disease, increasing their worrying of being infected themselves and transmitting to their colleagues, friends and family, with common experiencing of feelings of fear and helplessness<sup>67</sup>. Further, heavy

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and uncomfortable protective gear must be worn for several hours and, in parallel, in the case of Personal Protective Equipment shortages (as happened in the first phase of the epidemic), the risk of infection dramatically increases<sup>67</sup>. Social distancing measures, greatly practiced in the current pandemic as an important tackle to limit the disease outbreak, is greatly required to frontline HCWs. Thus, the need of HCWs to maintain distance from their family members, friends and colleagues, can result in lack of emotional support from the significant others and adds to emotional stress and impairment in social and private leisure activities<sup>15,69</sup>. Moreover, some authors reported HCWs in general and frontline HCWs in particular, to be at risk of lack of control over their lives, especially during periods of isolation and quarantine and revealed perceived stigma to be a major mediator for psychiatric problems associated with higher distress and negative consequences on frontline HCWs' wellbeing with negative effect on leisure time and ability to relax<sup>15,70-72</sup>.

However, when discussing the present study, some limitations should be taken into account. First, the sample size was relatively small. Second, the cross-sectional study design. Third, the use of self-administered assessments.

### CONCLUSIONS

Among HCWs facing the first period of the covid-19 pandemic, clinical characteristics demonstrated a stronger association with both work and social functioning than socio-demographic characteristics: higher levels of functioning impairment were found, indeed, among individuals with moderate to severe acute PTSS, depressive and anxiety symptoms with respect to those without. Particularly, acute PTSS and depressive symptoms were predictive factors of impairment in each domain of functioning analyzed. Anxiety symptoms were associated with impairment in both working and home management activities. Further, frontline activity was associated with impairment in both private and social leisure activities. Therefore, further longer-term perspective studies are needed to better investigate the psychopathological burden on HCWs' work and social functioning and to promote adequate intervention strategies for the current and future healthcare crises. Exploring such burden may prevent HCWs to develop negative coping strategies as well as absenteeism at the workplace and help to address tailored intervention strategies.

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