



# Sense of coherence, engagement, and work environment as precursors of psychological distress among non-health workers during the COVID-19 pandemic in Spain

Carlos Ruiz-Frutos<sup>a,b</sup>, Mónica Ortega-Moreno<sup>c,\*</sup>, Regina Allande-Cussó<sup>d</sup>,  
Diego Ayuso-Murillo<sup>e</sup>, Sara Domínguez-Salas<sup>f,1</sup>, Juan Gómez-Salgado<sup>a,b,\*</sup>,<sup>1</sup>

<sup>a</sup> Department of Sociology, Social Work and Public Health, Faculty of Labour Sciences, University of Huelva, 21007 Huelva, Spain

<sup>b</sup> Safety and Health Postgraduate Programme, Universidad Espíritu Santo, 092301 Guayaquil, Ecuador

<sup>c</sup> Department of Economy, University of Huelva, 21007 Huelva, Spain

<sup>d</sup> Department of Nursing, Faculty of Nursing, Physiotherapy, and Podiatry, University of Seville, Seville 41009, Spain

<sup>e</sup> General Council of Nursing, Madrid 28023, Spain

<sup>f</sup> Department of Psychology, Universidad Loyola Andalucía, Dos Hermanas, 41704 Sevilla, Spain

## ARTICLE INFO

### Keywords:

COVID-19  
Psychological distress  
Non-health workers  
Occupational health  
Public health

## ABSTRACT

**Background:** The interrelationship between the sense of coherence, work environment, work engagement, and psychological distress have particular interest in non-health workers who carried out essential activities during the COVID-19 pandemic.

**Objective:** To assess the effects of the COVID-19 on the physical and mental health of non-health workers.

**Design:** Observational descriptive cross-sectional study.

**Data sources:** 1089 questionnaires have been analysed. Engagement (UWES-9), sense of coherence (SOC-13), mental health (Goldberg GHQ-12), demographic data, perception of health and stress and work environment were assessed.

**Results:** At low levels of engagement, the percentage of distress is higher (77.9%). Low levels of sense of coherence correspond to the highest percentages of distress (86.3%). The 94.1% believe it necessary for professionals and volunteers involved in COVID-19 to receive psychological support. Low comprehensibility is mediated by the perception of stress; if the perception is low, comprehensibility is modulated by the level of significance; if it is low, it generates 95.9% of distress.

**Conclusion:** The interrelationship between the sense of coherence, work environment, work engagement, and psychological distress have particular interest in non-health workers who carried out essential activities during the COVID-19 pandemic. Almost all respondents believed that professionals and volunteers involved in COVID-19 should receive psychological support. This may be an indicator of the effect of the COVID-19 pandemic on workers' mental health.

## 1. Introduction

The SARS-COV-2, COVID-19, began on 31 December 2019 in Wuhan, Hubei Province, China, and was confirmed on 7 January 2020, preceded in the last 20 years by SARS-COV-1 in 2003, and MERS-COV in 2012. COVID-19 is becoming more virulent, with a greater association to admissions in intensive care units and higher mortality (Huang et al.,

2020). In a very short time, COVID-19 has transformed and uprooted lives around the world, and while there are clear differences with other pandemics such as HIV, from which it differs in the form of transmission and natural history, these also have points in common like the denial of the associated dangers, or the role that public health may play (Edelman et al., 2020). It should be reminded that HIV continues claiming more than a million lives worldwide every year (Collaborators GH, 2016). The

\* Corresponding authors at: Campus El Carmen, Universidad de Huelva, Av. de 3 de Marzo, Huelva 21007, Spain.

E-mail addresses: [frutos@uhu.es](mailto:frutos@uhu.es) (C. Ruiz-Frutos), [ortegamo@uhu.es](mailto:ortegamo@uhu.es) (M. Ortega-Moreno), [rallande@us.es](mailto:rallande@us.es) (R. Allande-Cussó), [d.ayuso@consejogeneralenfermeria.org](mailto:d.ayuso@consejogeneralenfermeria.org) (D. Ayuso-Murillo), [sdominguez@uloyola.es](mailto:sdominguez@uloyola.es) (S. Domínguez-Salas), [salgado@uhu.es](mailto:salgado@uhu.es) (J. Gómez-Salgado).

<sup>1</sup> Senior authors, these authors contributed equally to this work and should be regarded as equal.

COVID-19 pandemic has led to a global recession, with great economic volatility and psychological insecurity, which has resulted in companies laying off many employees and empowering information and communication technologies to replace workers with intelligent machines and artificial intelligence (Ren et al., 2020).

The sense of coherence (SOC), proposed by Antonovsky within the salutogenic model, explains why certain people do not lose their health when faced with stressful situations, strengthening personal resources to prevent both psychic and physical disturbances (Antonovsky, 1987). The SOC is a source of health promotion and a good predictor of burnout, depression, and job satisfaction rates (Masanotti et al., 2020). Coping has been positively related to the SOC, and both SOC and engagement have been negatively related to exhaustion (Mitonga-Monga and Mayer, 2020). It is known that the sense of coherence has a negative correlation with developing post-traumatic stress, which could be equalled to the stress produced by the COVID-19 pandemic, though this correlation is positive with regards to tolerance to extraversion and frustration (Frommberger et al., 1999). The need for further research has been raised to find out whether the relationship between the SOC and post-traumatic stress is of the causal type, and what factors may moderate it (Schäfer et al., 2019). The effects of post-traumatic stress on causing anxiety and depression have evidenced a higher percentage of post-traumatic stress among women (Carmassi et al., 2018; Christiansen and Elkliit, 2008; Ditlevsen and Elkliit, 2012) along with high costs for the public health services and for each individual (Lamoureux-Lamarche et al., 2016).

The short time since the start of the pandemic by COVID-19 prevents us from having reliable data on the post-traumatic stress effects of this pandemic. However, experience from previous pandemics and first published results (Rajkumar, 2020) lead to the idea that it has effects on psychological vulnerability such as resilience, among others (Conversano et al., 2020).

The COVID-19 pandemic poses a huge challenge, affecting all companies worldwide, both in technical and physical aspects, and with sociopsychological repercussions never seen before (Carnevale and Hatak, 2020). In these times of crisis and uncertainty, the influence that Health Authorities have to provide adequate information through the media and social networks is well-known, as this increases the commitment of citizens and fosters higher levels of compliance with preventive measures against COVID-19. Formal aspects are also important, and it is advisable to include images or videos when the information given is positive, and plain text when it is negative (Chen et al., 2020).

It is known that, when working conditions promote trusted relationships and a cooperative working environment this helps prevent mental illness (Gomez et al., 2019). In the study, they assumed that “engagement” is characterised by energy, participation, and effectiveness, which are considered direct opposites of the three dimensions of exhaustion, cynicism, and lack of professional efficiency, respectively. Committed employees have a sense of energetic and effective connection to their work activities and see themselves as able to fully handle the demands of their work. Work engagement corresponds with low values of exhaustion and cynicism, and high values of efficiency (Schaufeli et al., 2002). It has been seen that work engagement (engagement) is greatly influenced by the degree of job satisfaction, where the sense of coherence and, to a lesser extent, resilience are acting as a modulating factor (Derbis and Jasiński, 2018). This resilience can be defined as “the maintenance or rapid recovery of mental health during or after periods of exposure to stress, as a result of a potentially traumatic event, challenging life circumstances, a critical phase of life transition, or a physical illness”. There is still uncertain evidence on the positive effects of training on such resilience (Kunzler et al., 2020). Coping skills have a moderating effect regarding the SOC and engagement variables (Mitonga-Monga and Mayer, 2020). It has been proven that taking action on the social capital of companies generates well-being among their workers and also benefits the organisation, which gains efficiency and lower turnover rates (Jutengren et al., 2020) and that those who engage

deeply in worthwhile activities enjoy better health and well-being, have stronger and more abundant social ties, and even greater resistance to stress, something not so clear when there is a great deal of environmental uncertainty (Burrow and Hill, 2020).

Most studies focus on the psychological effects of COVID-19 on health workers, forgetting that many other workers have had to work away from home to perform the so-considered essential activities or have had to adapt their work to teleworking and do it from home (Burdorf et al., 2020). The objective of this study has been to know the interrelationship between the sense of coherence, work environment, work engagement, and psychological distress, in a collective of non-health workers during the period of confinement (quarantine) in Spain, differentiating between those who work away from home, as they belong to activities considered essential, and those who had to work from home.

## 2. Materials and methods

A cross-sectional observational descriptive design study was carried out on a sample of 1038 non-health workers, of which 461 worked away from home, for belonging to the so-considered essential activities during the pandemic period, and 577 workers who were working from home. As inclusion criteria, it was used: (i) being 18 years of age or older; (ii) being a currently active worker; and (iii) having accepted the informed consent. The exclusion criteria were: (i) being under the age of 18; (ii) being a healthcare worker; and (iii) not living in Spain at the time of filling in the questionnaire.

### 2.1. Instruments

From previous studies, a number of questions were adapted to include the necessary information for the study (Wang et al., 2020). These included, in addition to sex and age, questions about the working environment during the pandemic regarding: effectiveness, safety, conflict, risk, acceptance, psychological help, burden, stress, and satisfaction. The categorisation of those variables related to the work environment, with scores between 1 and 10, was transformed into negative response for values lower than or equal to five, and into positive response otherwise.

The level of engagement was evaluated using the UWES-9 short scale, translated and validated in many languages (Schaufeli et al., 2006). It contains 9 items with a Likert-type response (1: never to 7: always) and includes 3 dimensions: vigour, dedication, and absorption. A high score means that the worker feels identified with their work. The total scores obtained in each of the dimensions were categorised into: low, intermediate, or high, where low grouped non-health workers with scores between the minimum and the 25th percentile, mean 50% of the cases, and high between the 75th percentile and the maximum value. In our study, the global instrument obtained a Cronbach’s alpha of 0.942 and an internal consistency of  $\alpha = 0.856$  for the vigour dimension, of  $\alpha = 0.905$  for dedication, and  $\alpha = 0.847$  for the absorption dimension.

The sense of coherence was assessed using Antonovsky’s 13-item questionnaire (SOC-13) in its Spanish version (Virues-Ortega et al., 2007). The overall score ranges from 13 to 91 points. It contains three dimensions: Meaningfulness, Comprehensibility, and Manageability. These are categorised with criteria similar to those described for the UWES-9 questionnaire. In our study, a Cronbach’s alpha of 0.812 and internal consistency indexes of  $\alpha = 0.575$  for Meaningfulness, of  $\alpha = 0.666$  for Comprehensibility, and of  $\alpha = 0.600$  for Manageability were obtained.

Goldberg’s GHQ-12 General Health Questionnaire (Goldberg et al., 1997) was used to assess mental health and psychological adjustment, which serves as a screening for non-psychotic psychiatric disorders and has previously been used in other epidemics, such as SARS (Tam et al., 2004). It includes a scale of 12 items, with four response and overall rating options from 0 to 12. Our study obtained a Cronbach’s alpha of

0.869 and established a cut-off point of 3 or more points to determine the presence of psychological distress.

2.2. Procedure

A bibliographic review was conducted on studies performed on previous epidemics, that helped develop the questionnaire. A group of professionals made up of 10 experts: psychologists, doctors, and nurses, assessed the first draft. Subsequently, 57 people piloted the questionnaire, 49.10% women with a mean age of 41.87 years, 57.90% with postgraduate studies, and 56.10% of them married. None of them found any understanding problems.

The surveys began 13 days after the declaration of health alert status, between 26 March and 26 April 2020, and involved confinement at home except for work activities considered essential. E-mails were sent to different professional groups who were asked to facilitate their dissemination. Data collection was carried out through the online survey platform Qualtrics®.

2.3. Data analysis

A descriptive analysis was performed based on the absolute frequencies and percentages of variables that collect information on sex, age, engagement, work environment, and sense of coherence. In order to contrast the existence or not of a relationship between these variables and the presence of psychological distress, the  $\chi^2$  association test was used, distinguishing the complete sample of non-health workers and those who worked away or from home.

The CHAID method was used to construct a classification tree to detect which characteristics related to engagement, work environment, and sense of coherence played a relevant role in the presence of non-psychological distress. To do this, using the  $\chi^2$  test of independence, those with the lowest adjusted p value were searched among the

predictors, as long as that value was less than or equal to the level of significance set in  $\alpha = 0.05$ .

The analyses were carried out with the statistical software SPSS 26.0 (IBM, Armonk, NY).

2.4. Ethical principles

Through informed consent, the permission was obtained from the participants who expressed their voluntary desire to participate in the study. The anonymity and confidentiality of the data collected was maintained and has the favourable report of the Research Ethics Committee of Huelva, belonging to the Regional Ministry of Health of Andalusia (PI 036/20), having complied with all the ethical principles contained in the Helsinki Declaration.

3. Results

65.2% of non-health workers have psychological distress. This fact is significantly associated with sex ( $p < 0.001$ ) and age ( $p = 0.001$ ), but not for those who work away or from home ( $p = 0.106$ ). A high distress level ( $\text{GHQ-12} \geq 3$ ) is higher among females (71.8%) than among males (52.5%). Differences with respect to sex are maintained both in workers who carry out their activity away from home,  $p = 0.001$  and those who do so from home  $p < 0.001$ . The level of psychological distress is also higher among workers aged 43 years or younger (69.9%) than among those over this age (60.2%). This association is maintained among those who work from home ( $p = 0.009$ ) and is close to being statistically significant among those who work away from home ( $p = 0.054$ ).

3.1. Psychological distress depending on the level of engagement

In Table 1, the overall level of engagement is associated with the level of psychological distress,  $p < 0.001$ . At low levels of engagement,

**Table 1**  
Association between the UWES dimensions and psychological distress among active non-health workers.

	Non-health workers (N = 1038)					Non-health workers Working away from home (N = 461)					Non-health workers Working from home (N = 577)				
	GHQ			$\chi^2$	P	GHQ			$\chi^2$	p	GHQ			$\chi^2$	p
	N (%)	NO (N = 361)	YES (N = 677)			N (%)	NO (N = 148)	YES (N = 313)			N (%)	NO (N = 213)	YES (N = 364)		
<b>VIGOUR</b>															
Low	287 (27.6)	20.2	79.8			126	19.0	81.0			161	21.1	78.9		
Intermediate	606 (58.4)	38.0	62.0	45.041	<0.001	271	33.2	66.8	22.980	<0.001	335	41.8	58.2	25.061	<0.001
High	145 (14.0)	50.3	49.7			64	53.1	46.9			81	48.1	51.9		
<b>DEDICATION</b>															
Low	299 (28.8)	24.4	75.6			125	23.2	76.8			174	25.3	74.7		
Intermediate	557 (53.7)	37.9	62.1	21.071	<0.001	258	34.1	65.9	7.111	0.029	299	41.1	58.9	14.781	0.001
High	182 (17.5)	42.3	57.7			78	39.7	60.3			104	44.2	55.8		
<b>ABSORPTION</b>															
Low	225 (21.7)	22.7	77.3			109	25.7	74.3			116	19.8	80.2		
Intermediate	578 (55.7)	37.7	62.3	18.729	<0.001	246	34.6	65.4	2.776	0.250	332	40.1	59.9	18.883	<0.001
High	235 (22.6)	39.1	60.9			106	33.0	67.0			129	44.2	55.8		
<b>UWES</b>															
Low	276 (26.6)	22.1	77.9			126	22.2	77.8			150	22.0	78.0		
Intermediate	529 (51.0)	37.2	62.8	30.097	<0.001	237	32.5	67.5	11.893	0.003	292	41.1	58.9	19.807	<0.001
High	233 (22.4)	44.2	55.8			98	43.9	56.1			135	44.4	55.6		

there are higher percentages of distress (77.9%) than at intermediate levels (62.8%) and high levels (55.8%). This same trend is seen both in the group of workers working away from home and among those who work from home.

There is also an association between the three dimensions of engagement (vigour, dedication, and absorption) and the fact of presenting or not psychological distress, with  $p < 0.001$  in the three dimensions. With low levels of “vigour”, the percentage of distress is higher (79.8%) than with an intermediate (62.0%) or high level (49.7%). This gradual difference according to the level of vigour is maintained both in workers who carry out their activity away from home and among those who work from home. The “dedication” dimension also has a higher percentage of distress at low levels (75.6%) than at intermediate (62.1%) and at its highest levels (57.7%). This gradual association according to the level of “dedication” is maintained both in workers who perform their activity at home and away from it. The “absorption” dimension also shows higher percentage of distress at its lowest level (77.3%) than at its intermediate (62.3%) and highest levels (60.9%). The association is statistically significant in those who work at home, but it is not among those who work away from home  $p = 0.250$  (Table 1).

The segmentation tree for the level of psychological distress based on sex, age, workplace (from home or away), and the UWES-9 test dimensions (Fig. 1), shows the vigour dimension in its first node, being the most significant variable. For each of the three formed groups (low, intermediate, and high), different criteria were obtained for the construction of the tree, not appearing the variables age and absorption. Low vigour generates a distress of 79.8%. An intermediate vigour is mediated by a second node by sex, and if it is female, it generates 68.3% of distress, while if it is male, it is mediated by a third node by the workplace, generating 58.5% of distress among those working away from home, and 43.8% of distress in those working from home. If the vigour is high, it is also mediated by a second node by sex. If it is female, it is mediated by a third node by age, and if it is young (43 years or younger), it is mediated by a fourth node by dedication. If dedication is high, it generates 88.9% of distress while, if dedication is low or intermediate, the distress is at 37.5%. Conversely, if the female is over the age of 43, the distress is set at 48.8%. If vigour is high and it is male, the distress is at 27.6%.

### 3.2. Work environment and psychological distress

The percentage of non-health workers who claim that the company has not provided them with material and means to effectively carry out

their work is 35.5%, slightly higher among workers who are active away from home (42.3%), without finding a statistically significant association regarding the presence of psychological distress. The answer is very similar among those who claim that the company has not provided them with the necessary material and means to safely carry out their work.

There is no independence regarding the perception or not of increased labour conflict in the workplace and the level of distress,  $p < 0.001$ . The percentage of distress is higher among those with this concern (79.76%) than among those who do not perceive this labour conflict (60.56%). This difference persists both in those who work away from home and in those who do so from home, albeit with a higher percentage of stress found among those who perceive this conflict and work away from home (83.06%).

The perception that the profession or workplace puts the person at risk of being infected is also associated with the level of distress among non-health workers,  $p = 0.013$ . It is noted that, among those who perceive this concern, the percentage of distress is higher (69.38%) than among those who do not perceive it (61.99%). This difference is statistically significant among those who work at home, but not among those who do their activity away from home.

The percentage of those who claim to accept the risk of getting infected (22.9%) slightly increases among workers who do so away from home (28.6%) and is smaller among those who work from home (18.4%). There is no statistically significant association with respect to the percentage of psychological distress between those who accept the risk of becoming infected as part of their work and those who do not (Table 2).

94.1% of respondents believe it necessary that professionals and volunteers involved in COVID-19 should receive psychological support. An association is observed depending on whether there is presence of psychological distress, but not in the sub-group that works away from home. A similar percentage (95.7%) believes that psychological support should extend to the sick and their families, decreasing to 85.7% for those who believe that psychological support should be given to the general population. A statistically significant association can be seen according to the level of distress both among workers who perform their work from home and those who do so away from home (Table 2).

The percentage of workers with a high level of distress is higher among those who “consider that there is an increase in their workload after the start of the health alert” (69.89%) than among those who do not (59.57%). The non-independence of these variables,  $p < 0.001$ , remains statistically significant both among workers working away from home and among those who do so from home.

When asked if “they feel more stressed at work”, the percentage of

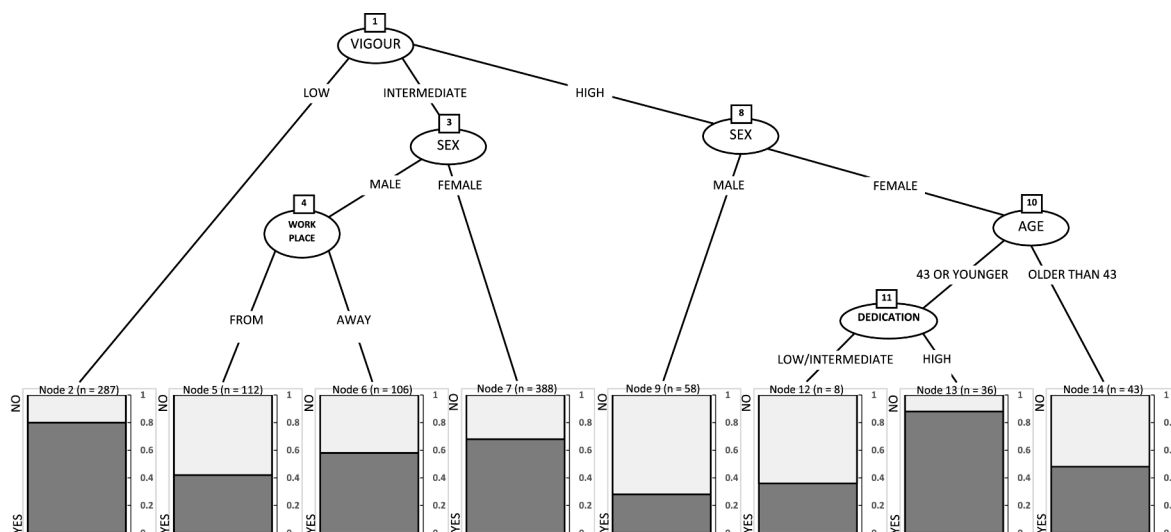


Fig. 1. Segmentation tree displaying the level of psychological distress on the basis of sex, age, workplace, and engagement dimensions.

**Table 2**  
Association between work environment and psychological distress among active non-health workers.

	Non-health workers (N = 1038)					Non-health workers Working away from home (N = 461)					Non-health workers Working from home (N = 577)				
	GHQ			$\chi^2$	p	GHQ			$\chi^2$	P	GHQ			$\chi^2$	p
	N (%)	NO (N = 361)	YES (N = 677)			N (%)	NO (N = 148)	YES (N = 313)			N (%)	NO (N = 213)	YES (N = 364)		
<b>EFFECTIVENESS</b>															
No	368 (35.5)	31.0	69.0	3.630	0.057	195 (42.3)	29.2	79.8	1.280	0.268	173 (30.0)	32.9	67.1	1.670	0.196
Yes	670 (64.5)	36.9	63.1			266 (57.7)	34.2	65.8			404 (70.0)	38.6	61.4		
<b>SAFETY</b>															
No	347 (33.4)	31.4	68.6	2.604	0.107	196 (42.5)	28.6	71.4	1.952	0.162	151 (26.2)	35.1	64.9	0.290	0.591
Yes	691 (66.6)	36.5	63.5			265 (57.5)	34.7	65.3			426 (73.8)	37.6	62.4		
<b>CONFLICT</b>															
No	786 (75.7)	39.44	60.56	31.019	<0.001	337 (73.1)	37.69	62.31	17.905	<0.001	449 (77.8)	40,76	59,24	12.830	<0.001
Yes	252 (24.3)	20.24	79.76			124 (26.9)	19.94	83.06			128 (22.2)	23,44	76,56		
<b>RISK</b>															
No	584 (56.3)	38.01	61.99	6.161	0.013	220 (47.7)	34.09	65.91	0.762	0.383	364 (63.1)	40.38	59.62	5.097	0.024
Yes	454 (43.7)	30.62	69.38			241 (52.3)	30.29	69.71			213 (36.9)	30.99	69.01		
<b>ACCEPTANCE</b>															
No	800 (77.1)	34,25	65,75	0.430	0.512	329 (71.4)	32,22	67,78	0.007	0.934	471 (81.6)	35,67	64,33	1.710	0.191
Yes	238 (22.9)	36,55	63,45			132 (28.6)	31,82	68,18			106 (18.4)	42,45	57,55		
<b>PSICO1</b>															
No	61 (5.9)	47.5	52.5	4.654	0.031	28 (6.1)	39.3	60.7	0.705	0.401	33 (5.7)	54.5	45.5	4.672	0.031
Yes	977 (94.1)	34.0	66.0			433 (93.9)	31.6	68.4			544 (94.3)	35.8	64.2		
<b>PSICO2</b>															
No	45 (4.3)	51.1	48.9	5.532	0.019	17 (3.7)	52.9	47.1	3.516	0.061	28 (4.9)	50.0	50.0	2.164	0.141
Yes	993 (95.7)	34.0	66.0			444 (96.3)	31.3	68.7			549 (95.1)	36.2	63.8		
<b>PSICO3</b>															
No	148 (14.3)	48.6	51.4	14.640	<0.001	64 (13.9)	45.3	54.7	5.948	0.015	84 (14.6)	51.2	48.8	8.603	0.003
Yes	890 (85.7)	32.5	67.5			397 (86.1)	30.0	70.0			493 (85.4)	34.5	65.5		
<b>BURDEN</b>															
No	470 (45.3)	40,43	59,57	12.075	0.001	238 (51.6)	38,66	61,34	9.688	0.002	232 (40.2)	42,24	57,76	4.727	0.030
Yes	568 (54.7)	30,11	69,89			223 (48.4)	25,11	74,89			345 (59.8)	33,33	66,67		
<b>STRESS</b>															
No	458 (44.1)	50,22	49,78	86.144	<0.001	207 (44.9)	47,83	52,17	42.604	<0.001	251 (43.5)	52,19	47,81	44.518	<0.001
Yes	580 (55.9)	22,59	77,41			254 (55.1)	19,29	80,71			326 (56.5)	25,15	74,85		
<b>SATISFATION</b>															
No	398 (38.3)	25,13	74,87	26.516	<0.001	201 (43.6)	27,86	72,14	2.944	0.086	197 (34.1)	22,34	77,66	27.305	<0.001
Yes	640 (61.7)	40,78	59,22			260 (56.4)	35,38	64,62			380 (65.9)	44,47	55,53		

**EFFECTIVENESS.** Do you think your department, service, unit or company has provided you with the necessary means and material to EFFECTIVELY carry out your job? **SAFETY.** Do you think your department, service, unit or company has provided you with the necessary means and material to SAFELY carry out your job? **CONFLICT.** Have you observed any increase in labour conflict in your job? **RISK.** Do you think your profession or workplace put you at risk of getting infected? **ACCEPTANCE.** Do you accept the risk of getting infected as part of your job? **PSICO1.** Do you believe it would be important to offer psychological support to professionals and volunteers who are actively taking part in the COVID-19 health crisis? **PSICO2.** Do you believe it would be important to offer psychological support to persons and their families who are directly affected by COVID-19 to deal with the difficulties arisen from the health crisis? **PSICO3.** Do you believe it would be important to offer psychological support to the general population to deal with the difficulties arisen from the COVID-19 health crisis? **BURDEN.** Do you consider there has been an increase in the workload after the onset of the health crisis? **STRESS.** Do you feel more stressed at work? **SATISFATION.** How would you score your job satisfaction during the present COVID-19 situation? **DISTANCE.** Do you consider appropriate the distance maintained with your work mates? **CONTACT.** Are you in contact with clients/users/patients that could be a source of risk?

those who give a positive answer and present a level of high distress is 77.41%, while for those who give a negative answer, is 49.78%. This association is statistically significant,  $p < 0.001$ , and maintained both among workers who carry out their activity at home and those who do so away, obtaining higher relative values of distress those who work away from home.

It is seen that the level of psychological distress is higher among those who claim to have a lower degree of satisfaction with their work in the current COVID-19 situation (74.87%) than among those who claim to have a higher degree of satisfaction (59.22%). This association is statistically significant among those who work from home, but not among those who work away from home.

Fig. 2 shows how whether or not feeling more stressed is the most significant variable in the segmentation tree, finding it in the first node. Perceived stress is mediated by sex in a second node, and by female in a third node (age), in which younger women (43 years or younger) generate 86.1% of distress, and those over that age generate 75.8%, while among males it is mediated by a third node, which is the degree of perceived labour conflict. Those who perceive this conflict show a percentage of distress of 82.0%, and those without this conflict show a percentage of 62.4%.

### 3.3. Psychological distress and sense of coherence

From the results shown in Table 3, we can say that the overall level of sense of coherence (SOC) is associated with the level of psychological distress,  $p < 0.001$ . A lower level of SOC corresponds to the highest percentages of distress (86.3%), being the mean level 62.3% and evidencing a high level of SOC (47.7%). The same trend occurs for those who work from home and those who do so away. The three dimensions of the SOC have an association with psychological distress, being  $p < 0.001$  for the three dimensions, and equal trend. Thus, in the “meaningfulness” dimension, in its lowest levels, the percentage of distress is 76.4%; at intermediate levels, it is 62.9%; and at the highest level, it is 54.7%. This trend is maintained both in those who work away from home and those who do so from home, with higher relative values among those who work away from home. The percentage of high levels of distress among those with a low value in the “comprehensibility” dimension is 86.8%; among those with an intermediate level, it is 61.9%; and this percentage falls to 45.6% in those with high levels of comprehensibility. This trend is maintained both among those who work away from home and those who do so from home. In the third of the

dimensions, “manageability”, a similar trend occurs. The percentage of those with high levels of distress among those with low levels of manageability is 81.5%, decreasing to 63.1% among those with intermediate levels of manageability and to 51.6% among those with high levels,  $p < 0.001$ . This trend is maintained among those who work away from home and those who do so from home.

In Fig. 3, node 1 of the segmentation tree starts from Comprehensibility, distinguishing different criteria in the tree construction and not appearing the significance dimension. Low comprehensibility results in levels of distress of 86.8%. Intermediate comprehensibility is mediated by a second node (sex), in which females show levels of distress of 69.2%. Males are mediated by a third node, that deals with the work place; if work is done from home, they show 42.2% of distress, and if work is done away from home, it is mediated by a fourth node (manageability). Here, if manageability levels are low or intermediate, a distress of 68.1% is obtained, and if manageability levels are high, the distress is of 36.0%, showing this branch the minimum percentage of psychological distress. If comprehensibility levels are high, it is mediated by, as in the previous case, sex, presenting a percentage of distress of 36.6% in the case males, of 43.2% in females over 43 years, and of 59.7% in females aged 43 or younger.

### 3.4. Psychological distress, SOC, UWES and work environment

Comprehensibility, one of the test dimensions on the sense of coherence, is found as the most significant variable with respect to the level of psychological distress, followed by feeling more or less stressed at work.

Low comprehensibility and the presence of stress result in the highest percentages of non-health workers with psychological distress, 95.9% in case of having a low level of significance, and 84.2% if the significance is intermediate or high. The percentage of cases with psychological distress is reduced to 80.6% with low comprehensibility and no perception of stress.

If comprehensibility levels are intermediate and non-health workers are stressed, the percentage of cases with psychological distress was 80.2% among females and was reduced to 65.3% among males. Maintaining comprehensibility at intermediate levels and without presence of stress (second level node), the situation of no job satisfaction during the pandemic results in 64.8% of cases with psychological distress, while this percentage decreases if there is job satisfaction. Job satisfaction was mediated by a fourth node (sex), which showed 44.4% of psychological

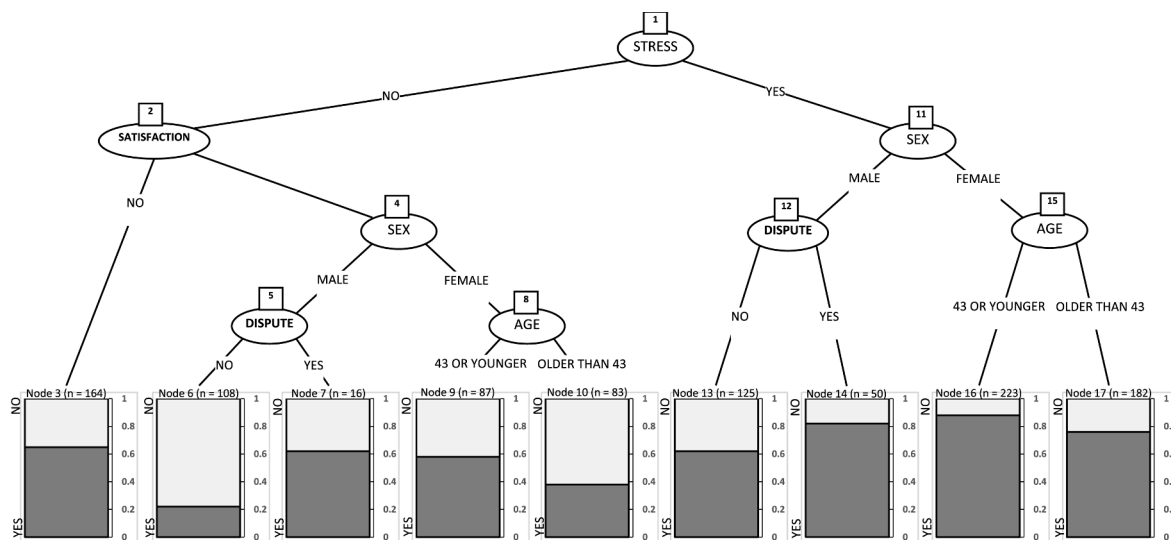
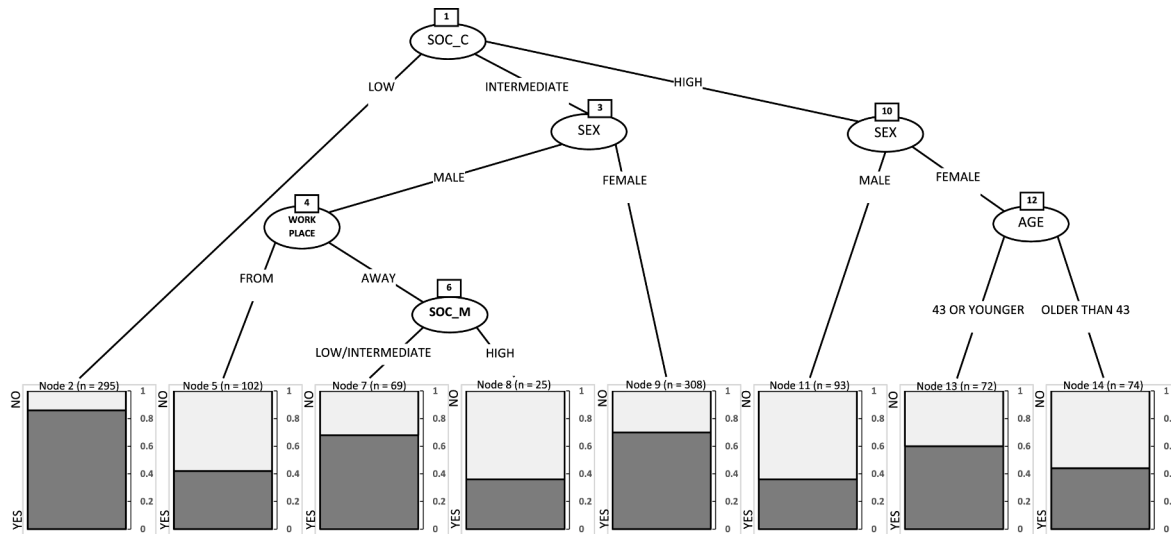


Fig. 2. Segmentation tree displaying the level of psychological distress on the basis of sex, age, workplace, and work environment dimensions. **CONFLICT**. Have you observed any increase in labour conflict in your job? **STRESS**. Do you feel more stressed at work? **SATISFACTION**. How would you score your job satisfaction during the present COVID-19 situation?

**Table 3**  
Association between the SOC dimensions and psychological distress among active non-health workers.

	Non-health workers (N = 1038)				Non-health workers Working away from home (N = 461)					Non-health workers Working from home (N = 577)					
	N (%)	GHQ		$\chi^2$	p	N (%)	GHQ		$\chi^2$	p	N (%)	GHQ		$\chi^2$	p
		NO (N = 361)	YES (N = 677)				NO (N = 148)	YES (N = 313)				NO (N = 213)	YES (N = 364)		
<b>COMPREHENSIBILITY (SOC_C)</b>															
Low	295 (28.4)	13.2	86.8			142	13.4	86.6			153	13.1	86.9		
Intermediate	504 (48.6)	38.1	61.9	103.425	<0.001	228	35.5	64.5	41.854	<0.001	276	40.2	59.8	60.371	<0.001
High	239 (23.0)	54.4	45.6			91	52.7	47.3			148	55.4	44.6		
<b>MANAGEABILITY (SOC_M)</b>															
Low	281 (27.1)	18.5	81.5			142	18.3	81.7			139	18.7	81.3		
Intermediate	499 (48.1)	36.9	63.1	55.030	<0.001	208	31.2	68.8	31.331	<0.001	291	40.9	59.1	27.281	<0.001
High	258 (24.9)	48.4	51.6			111	51.4	48.6			147	46.3	53.7		
<b>MEANINGFULNESS (SOC_S)</b>															
Low	309 (29.8)	23.6	76.4			147	19.0	81.0			162	27.8	72.2		
Intermediate	515 (49.6)	37.1	62.9	28.656	<0.001	220	36.8	63.2	17.538	<0.001	295	37.3	62.7	12.544	0.002
High	214 (20.6)	45.3	54.7			94	41.5	58.5			120	48.3	51.7		
<b>SOC</b>															
Low	270 (26.0)	13.7	86.3			136	13.2	86.8			134	14.2	85.8		
Intermediate	531 (51.2)	37.7	62.3	86.970	<0.001	224	35.3	64.7	38.914	<0.001	307	39.4	60.6	46.974	<0.001
High	237 (22.8)	52.3	47.7			101	50.5	49.5			136	53.7	46.3		



**Fig. 3.** Segmentation tree displaying the level of psychological distress on the basis of sex, age, workplace, and SOC test dimensions. **SOC\_C** Comprehensibility **SOC\_M** Manageability.

distress among females and 17.5% among males working from home. Those working away from home are, in turn, mediated by the vigour dimension of the UWES-9 test: if vigour levels were low or intermediate, there were 57.1% cases of distress, and these were null with high levels of vigour.

With a high level of comprehensibility and a higher perception of

stress at work, as consequences of the pandemic, psychological distress is mediated by a third node, the “Dedication” dimension of the UWES test, which presents 94.1% with low levels of dedication and 57.7% with intermediate or high levels. If there is no high level of perception of stress, it is mediated by sex, differentiating 36.4% of psychological distress among females. In the case of males, it is mediated by a fourth

node, the Meaningfulness dimension of the SOC test, in which if Meaningfulness levels are low or intermediate, psychological distress is found in 29.0% of cases and, if Meaningfulness is high, psychological distress is at 0.0% (Fig. 4).

#### 4. Discussion

This study has allowed to analyse the impact on the psycho-emotional sphere of the non-health workers during the period of health alert by COVID-19 in Spain, differentiating between the group of workers included in the activities considered essential who had to work away from home, and those who carried out their activity from home, through telework.

Similar results to previous studies have been found (Gomez et al., 2019) that associate engagement with mental health,  $p < 0.001$ . We have seen how at low levels of engagement, the highest percentages of distress occur (77.9%), and this percentage progressively decreases with intermediate levels (62.8%) and with the highest levels of engagement (55.8%). Some authors propose further research on the association between work engagement and its effects on mental health, recommending that the possible modulation that management roles can offer should be joined (Van Zyl et al., 2020). There is a similar trend in the three dimensions of engagement: vigour, dedication, and absorption, and this happens both in the group of workers who work away from home and among those who work from home. A large number of respondents stated that, during the pandemic, the workload has increased. This can be partly explained by having to meet higher domestic demands, by the closure of day-care services, or by having to balance their work-life while working from home, finding an association between work engagement and domestic demands (Chen and Fellenz, 2020).

In our study, as in previous ones (Frommberger et al., 1999) low levels of sense of coherence are associated with the highest values of psychological distress, decreasing distress as the level of the sense of coherence increases, both in the overall assessment of SOC and in its three dimensions: comprehensibility, manageability, and meaningfulness. Following the recommendations to analyse in more detail both whether this association is of the causal type and also the variables that could interfere as modulating ones (Schäfer et al., 2019), we have found that mean comprehensibility levels are mediated by sex, and among males, by the workplace, depending on whether it is away or from home, and if work is done away, it is modulated by the degree of

manageability. Our study and previous ones (Carmassi et al., 2018; Christiansen and Elkliit, 2008; Ditlevsen and Elkliit, 2012) have shown that females have a higher percentage of distress after a post-traumatic period such as COVID-19. It is also considered logical that the workplace plays a role in this due to the risk of contagion of those who work away from home, although this effect would be partially offset by the effects of confinement at home and telework (Burdorf et al., 2020). In the case of high comprehensibility, the distress level is conditioned by sex, and in the case of females, by age. In our study, younger ages (less than or equal to 43 years) are associated with higher levels of distress, as in previous studies, where it has been associated with youth (Losada-Baltar et al., 2020)

Several variables of the working environment which appear to have changed after the establishment of the health alert status by COVID-19 have found an influence on the level of psychological distress. Levels of perception of labour conflict have increased, and this is associated with higher levels of distress when the perception is high (79.76%) than when the perception of labour conflict is low (60.56%). Also, there has been greater distress among those claiming to be in danger of becoming infected or in the high percentage of respondents who reported their workload increased. Workers working away from home and being in contact with customers or users who might be infected increases the level of psychological distress, a fact also observed in previous studies. On the other hand, not maintaining the recommended social distance with colleagues did not generate greater distress, as has been seen in other previous studies (Leung et al., 2005), and which could be explained by health authorities failing to offer clear information (Chen et al., 2020) or because the question was not properly understood.

In our study, we have seen that psychological distress is associated with the degree of perception of stress, as was also observed in previous studies (Wang et al., 2020) and modulated by the degree of job satisfaction. Other studies have linked commitment to work (engagement) to the degree of job satisfaction, where it seems that the sense of coherence can act as a modulating factor (Derbis and Jasiński, 2018) and produce greater stress resilience (Burrow and Hill, 2020).

Almost all respondents (94.1%) believed that professionals and volunteers involved in COVID-19 should receive psychological support, a similar percentage considered it necessary for the sick and their families, and a little lower percentage (85.7%) for the general population. This may be an indicator of what most respondents think that the effect of the COVID-19 pandemic is producing on mental health and the need

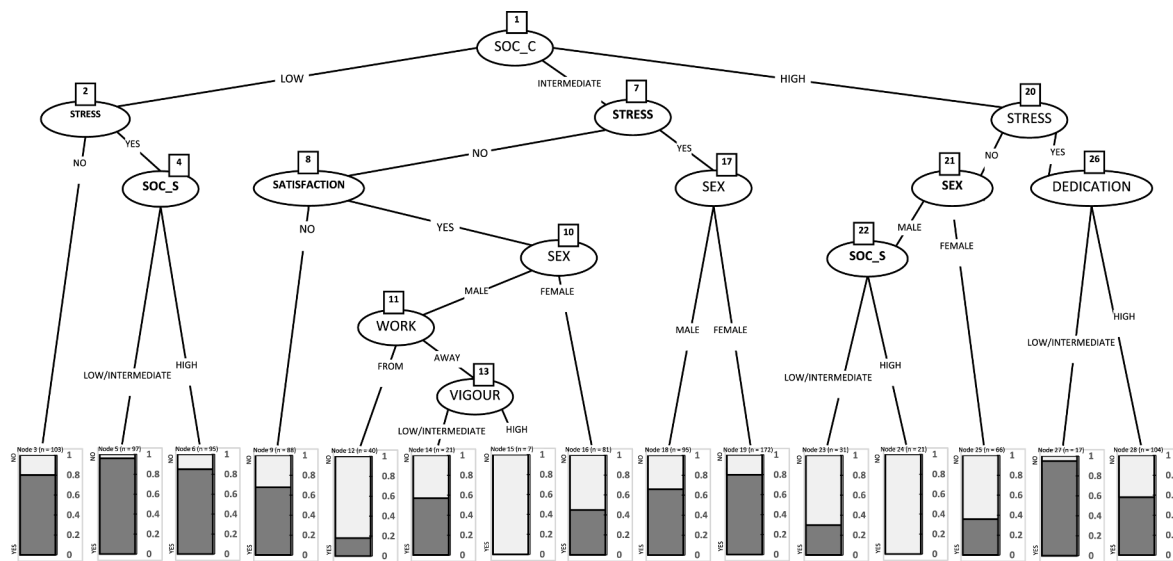


Fig. 4. Segmentation tree displaying the level of psychological distress on the basis of sex, age, workplace, and UWES-9 test dimensions, work environment variables and SOC test dimensions. **STRESS**. Do you feel more stressed at work? **SATISFACTION**. How would you score your job satisfaction during the present COVID-19 situation? **SOC\_C** Comprehensibility **SOC\_S** Meaningfulness.



for support.

## 5. Conclusions

35.5% of non-health workers were not provided with the means to effectively and safely carry out their activity, a percentage that was higher among those working away from home (42.3%). 94.1% of these workers believe it necessary that professionals and volunteers involved in COVID-19 should receive psychological support, and a similar percentage consider the same for the sick and their families.

The highest percentages of psychological distress are found with low levels of global engagement and in its three dimensions: vigour, dedication, and absorption. Also, high distress percentages are associated with the lowest levels of sense of coherence and in its three dimensions: comprehensibility, manageability, and meaningfulness.

When analysing the associations of psychological distress with the different dimensions of the UWES-9 test (sex, age, and workplace), it can be said that greater vigour reduces the percentage of cases with psychological distress. Among the variables related to the work environment, a greater perception of stress is associated with greater psychological distress, and this is significantly reduced in the case of being satisfied at work, or having not perceived an increase in labour conflicts during the pandemic.

## Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## References

- Antonovsky, A., 1987. *Unravelling the mystery of health: How people manage stress and stay well*. Jossey-Bass, San Francisco.
- Burdorf, A., Porru, F., Rugulies, R., 2020. The COVID-19 (Coronavirus) pandemic: consequences for 103 occupational health. *Scand. J. Work Environ. Health* 46 (3), 229–230. <https://doi.org/10.5271/sjweh.3893>.
- Burrow, A.L., Hill, P.L., 2020. Purpose by design or disaster: preserving a sense of purpose amid environmental uncertainty. *J. Environ. Psychol.* 69, 101436 <https://doi.org/10.1016/j.jenvp.2020.101436>.
- Carmassi, C., Gesi, C., Corsi, M., Cremona, I.M., Bertelloni, C.A., Massimetti, E., Oliveira, M.C., Coversano, C., Santini, M., Dell, O.S., 2018. Exploring PTSD in emergency operators of a major University Hospital in Italy: a preliminary report on the role of gender, age, and education. *Ann. Gen. Psych.* 17, 17. <https://doi.org/10.1186/s12991-018-0184-4>.
- Carnevale, J.B., Hatak, I., 2020. Employee adjustment and well-being in the era of COVID-19: implications for human resource management. *J. Bus. Res.* 116, 183–187. <https://doi.org/10.1016/j.jbusres.2020.05.037>.
- Chen, I.S., Fellenz, M.R., 2020. Personal resources and personal demands for work engagement: evidence from employees in the service industry. *Int. J. Hospitality Manage.* 90, 102600 <https://doi.org/10.1016/j.ijhm.2020.102600>.
- Chen, Q., Min, C., Zhang, W., Wang, G., Ma, X., Evans, R., 2020. Unpacking the black box: How to promote citizen engagement through government social media during the COVID-19 crisis. *Comput. Hum. Behav.* 110, 106380 <https://doi.org/10.1016/j.chb.2020.106380>.
- Christiansen, D.M., Elklit, A., 2008. Risk factors predict post-traumatic stress disorder differently in men and women. *Ann. Gen. Psychiatry* 7, 24. <https://doi.org/10.1186/1744-859X-7-24>.
- Collaborators GH, 2016. Estimates of global, regional, and national incidence, prevalence, and mortality of HIV, 1980–2015: the Global Burden of Disease Study 2015. *Lancet HIV* 3 (8), e361–e387. [https://doi.org/10.1016/S2352-3018\(16\)30087-X](https://doi.org/10.1016/S2352-3018(16)30087-X).
- Conversano, C., Marchi, L., Miniati, M., 2020. Psychological distress among healthcare professionals involved in the Covid-19 emergency: vulnerability and resilience factors. *Clin. Neuropsychiatry* 17 (2), 94–96. <https://doi.org/10.36131/CN20200212>.
- Derbis, R., Jasiński, A.M., 2018. Work satisfaction, psychological resiliency and sense of coherence as correlates of work engagement. *Cogent Psychol.* 5, 1451610. <https://doi.org/10.1080/23311908.2018.1451610>.
- Ditlevsen, D.N., Elklit, A., 2012. Gender, trauma type, and PTSD prevalence: a re-analysis of 18 nordic convenience samples. *Ann. Gen. Psychiatry* 11 (1), 26.
- Edelman, E.J., Aoun-Barakat, L., Villanueva, M., Friedland, G., 2020. Confronting another pandemic: lessons from HIV can inform our COVID-19 response. *AIDS Behav.* 24, 1977–1979. <https://doi.org/10.1007/s10461-020-02908-z>.
- Frommberger, U., Stieglitz, R.D., Straub, S., Nyberg, E., Schlickewei, W., Kuner, E., Berger, M., 1999. The concept of “sense of coherence” and the development of posttraumatic stress disorder in traffic accident victims. *J. Psychosom. Res.* 46 (4), 343–348. [https://doi.org/10.1016/S0022-3999\(98\)00117-2](https://doi.org/10.1016/S0022-3999(98)00117-2).
- Goldberg, D.P., Gater, R., Sartorius, N., Ustun, T.B., Piccinelli, M., Gureje, O., Rutter, C., 1997. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol. Med.* 27, 191–197. <https://doi.org/10.1017/S003291796004242>.
- Gomez, M.A.L., Sabbath, E., Boden, L., Williams, J.A.R., Jessica, A.R., Hopcia, K., Hashimoto, D., Sorensen, G., 2019. Organizational and psychosocial working conditions and their relationship with mental health outcomes in patient-care workers. *J. Occup. Environ. Med.* 61 (12), E480–E485. <https://doi.org/10.1097/JOM.0000000000001736>.
- Huang, C., Wang, Y., Li, X., et al., 2020. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 395, 497–506. [https://doi.org/10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5).
- Jutengren, G., Jaldestad, E., Dellve, L., Eriksson, A., 2020. The potential importance of social capital and job crafting for work engagement and job satisfaction among health-care employees. *Int. J. Environ. Res. Public Health* 17, 4272. <https://doi.org/10.3390/ijerph17124272>.
- Kunzler, A.M., Helmeich, I., Chmitorz, A., König, J., Binder, H., Wessa, M., Lieb, K., 2020. Psychological interventions to foster resilience in healthcare professionals. *Cochrane Database Syst. Rev.* 7, CD012527. <https://doi.org/10.1002/14651858.CD012527.pub2>.
- Lamoureux-Lamarche, C., Vasiliadis, H.M., Prévile, M., Berbiche, D., 2016. Healthcare use and costs associated with post-traumatic stress syndrome in a community sample of older adults: Results from the ESA-Services study. *Int. Psychogeriatr.* 28 (6), 903–911. <https://doi.org/10.1017/S1041610215001775>.
- Leung, G.M., Ho, L.M., Chan, S.K.K., Ho, S.Y., Bacon-Shone, J., Choy, R.Y.L., Hedley, A.J., Lam, T.H., Fielding, R., 2005. Longitudinal assessment of community psychobehavioral responses during and after the 2003 outbreak of severe acute respiratory syndrome in Hong Kong. *Clin. Infect. Dis.* 40 (12), 1713–1720. <https://doi.org/10.1086/429923>.
- Losada-Baltar, A., Jiménez-Gonzalo, L., Gallego-Alberto, L., Pedrosa-Chaparro, M.D.S., Fernandes-Pires, J., Márquez-González, M., 2020. “We Are Staying at Home”. Association of self-perceptions of aging, personal and family resources, and loneliness with psychological distress during the lock-down period of COVID-19. *J. Gerontol. B Psychol. Sci. Soc. Sci.*, gbaa048 <https://doi.org/10.1093/geronb/gbaa048>.
- Masanotti, G.M., Paolucci, S., Abbafati, E., Serratore, C., Caricato, M., 2020. Sense of coherence in nurses: a systematic review. *Int. J. Environ. Res. Public Health* 17, 1861. <https://doi.org/10.3390/ijerph17061861>.
- Mitonga-Monga, J., Mayer, C.H., 2020. Sense of coherence, burnout, and work engagement: the moderating effect of coping in the Democratic Republic of Congo. *Int. J. Environ. Res. Public Health* 17, 4127. <https://doi.org/10.3390/ijerph17114127>.
- Rajkumar, R.P., 2020. COVID-19 and mental health: a review of the existing literature. *Asian J. Psychiatry* 52, 102066. <https://doi.org/10.1016/j.ajp.2020.102066>.
- Ren, T., Cao, L., Chin, T., 2020. Crafting Jobs for occupational satisfaction and innovation among manufacturing workers facing the COVID-19 crisis. *Int. J. Environ. Res. Public Health* 17, 3953. <https://doi.org/10.3390/ijerph17113953>.
- Schäfer, S.K., Becker, N., King, L., Horsch, A., Michael, T., 2019. The relationship between sense of coherence and post-traumatic stress: a meta-analysis. *Eur. J. Psychotraumatol.* 10 (1), 1562839. <https://doi.org/10.1080/20008198.2018.1562839>.
- Schaufeli, W.B., Bakker, A.B., Salanova, M., 2006. The measurement of work engagement with a short questionnaire: a cross-national study. *Educ. Psychol. Measur.* 66 (4), 701–716. <https://doi.org/10.1177/0013164405282471>.
- Schaufeli, W.B., Salanova, M., Gonzalez-Roma, A., Bakker, A.B., 2002. The measurement of engagement and burnout: a two simple confirmatory factor analytical approach. *J. Happiness Stud.* 3, 71–92. <https://doi.org/10.1023/A:1015630930326>.
- Tam, C.W.C., Pang, E.P.F., Lam, L.C.W., Chiu, H.F.K., 2004. Severe acute respiratory syndrome (SARS) in Hong Kong in 2003: stress and psychological impact among frontline healthcare workers. *Psychol. Med.* 34, 1197–1204. <https://doi.org/10.1017/s003291704002247>.
- van Zyl, L.E., Rothmann, S., Nieman, C., 2020. Mental health, work engagement and meaningful work-role fit of industrial psychologists: a latent profile analysis. *Psychol. Stud.* 65 (2), 199–213. <https://doi.org/10.1007/s12646-019-00544-9>.
- Virues-Ortega, J., Martínez-Martin, P., del Barrio, J.L., Lozano, L.M., 2007. Cross-cultural validation of Antonovsky’s Sense of Coherence Scale (OLQ-13) in Spanish elders aged 70 years or more. *Med. Clin.* 128 (13), 486–492. <https://doi.org/10.1157/13100935>.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S., Ho, R.C., 2020. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int. J. Environ. Res. Public Health* 17, 1729. <https://doi.org/10.3390/ijerph17051729>.