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Research article

# Components of psychological health as determinants of psychological distress and well-being at work of frontline health professionals during pandemic



*Les composantes de la santé psychologique comme déterminants de la détresse psychologique et du bien-être au travail des professionnels de santé de première ligne lors d'une pandémie*

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## ABSTRACT

**Objectives.** – This project aimed to explore the impact of psychological distress (anxiety, depression and post-traumatic stress) and resilience on quality of life and psychological health at work (well-being or distress at work) of nursing home and healthcare staff members in the Moselle department in Northeastern France.

**Methods.** – In the spring of 2021 230 professionals replied to an online questionnaire. The theoretical model was tested through path analyses.

**Results.** – Results showed that higher resilience scores were associated with lower post-traumatic stress, anxiety, and depression scores. Anxiety and depression were negatively correlated with quality of life, while higher quality of life scores were linked to greater well-being at work. Resilience was found to have a significant impact on the psychological state of professionals, with differences observed between well-being and distress at work.

**Discussion.** – In conclusion, our study revealed that resilience plays a significant role in influencing the psychological state of professionals, ultimately impacting their psychological health at work. Therefore, interventions aimed at addressing anxiety, depression, and traumatic symptoms could potentially enhance resilience and mitigate work-related psychological disorders among frontline healthcare professionals.

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## RÉSUMÉ

**Objectifs.** – Ce projet visait à explorer l'impact de la détresse psychologique (anxiété, dépression et stress post-traumatique) et de la résilience sur la qualité de vie et la santé psychologique au travail (bien-être ou détresse au travail) du personnel des maisons de retraite et des établissements de santé du département de la Moselle, dans le nord-est de la France.

**Méthode.** – Au printemps 2021, 230 professionnels ont répondu à un questionnaire en ligne. Le modèle théorique a été testé par des analyses statistiques de chemin.

### Mots clés :

COVID-19

Détresse psychologique

Bien-être psychologique

Stress lié à l'activité

Professionnel de santé

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**Résultats.** – Les résultats ont montré que des scores de résilience plus élevés étaient associés à des scores de stress post-traumatique, d'anxiété et de dépression plus faibles. L'anxiété et la dépression sont négativement corrélées à la qualité de vie, tandis que des scores de qualité de vie plus élevés sont liés à un plus grand bien-être au travail. La résilience a un impact significatif sur l'état psychologique des professionnels, avec des différences observées entre le bien-être et la détresse au travail.

**Discussion.** – En conclusion, notre étude a révélé que la résilience joue un rôle important dans l'influence de l'état psychologique des professionnels, ce qui a finalement un impact sur leur santé psychologique au travail. Par conséquent, les interventions visant à traiter l'anxiété, la dépression et les symptômes traumatiques pourraient potentiellement renforcer la résilience et atténuer les troubles psychologiques liés au travail chez les professionnels de la santé de première ligne.

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## 1. Introduction

At the first peak of the COVID-19 epidemic in April 2020, 40,000 patients were hospitalized in France for COVID-19-related infection, including more than 7000 in intensive care units (for a usual capacity of 5000 beds) [1]. The Moselle department in Northeastern France was very affected with more than 3000 deaths related to COVID-19 (150,000 in total in France). For comparison with two French departments with equivalent populations (around 1 million), the total death rate for Moselle linked to Covid-19 is 18.3%, compared with 8.9% for Finistère (800 total deaths for 9500 hospitalizations) and 14.7% for Var (800 total deaths for 1900 hospitalizations). The Paris region, which saw the highest number of Covid-19-related deaths, had a death rate of 13.2% (6500 total deaths for 50,000 hospitalizations).

This situation has caused a significant work overload for the staff of the first line hospital services (SHPL, *Services Hospitaliers de Première Ligne* in french) who have had to reorganize urgently and mobilize or reorient their activities [2]. Residential facilities for the dependent elderly (EHPAD, *Établissements d'Hébergement pour Personnes Âgées Dépendantes* in french) experienced also significant difficulties in France, due to the particular vulnerability of the populations they serve [3]. In this context, healthcare workers in both EHPAD and SHPL experienced substantial organizational and individual stressors, leading to an anxiety-inducing environment at work. The main challenges included systemic issues such as shortages of personal protective equipment (PPE), insufficient medical supplies, changes in work arrangements (e.g., reassignment of roles, restructuring of workspaces, modification of working hours), and lack of communication, as well as individual stressors like exposure to contamination risks, disruption of family and social life, and burnout [2]. With regard to systemic issues, collective actions have been put in place by medical and ethical societies, such as the provision of institutional resources (e.g., a guideline written by the French Intensive Care Society to help physicians make decisions on how to care for seriously ill patients), the creation of ethical reflection groups, and the holding of weekly crisis meetings by departmental bodies (departmental council, territorial delegation of the Regional Health Agency, regional hospital center) [4]. For caregivers, psychological support systems have been set up, modelled on the existing medical-psychological emergency units (*Cellules d'Urgences Médico-Psychologiques* in French, CUMP) in many French hospitals [2,4].

Numerous studies on the experience of health professionals dealing with the COVID-19 pandemic consider this to be a situation that needs to be addressed urgently [5–7]. The first data on the psychological consequences of COVID-19 among professionals showed a prevalence of 14.5% of anxiety, 8.9% of depression and 7.7% of post-traumatic stress disorder (PTSD) among health care and non-health care workers in Singapore [8]. These data, which were still incom-

plete at the time of the study on the psychological consequences of COVID-19 in health care professionals, were in total agreement with those already observed in the context of other recent epidemics such as MERS (Middle East Respiratory Syndrome) in 2015 [9] or the older SARS-CoV-1 epidemic in 2003 [10]. A meta-analysis conducted in October 2020 integrating 70 studies on the prevalence of mental health problems among health professionals during this pandemic (nearly 100,000 participants), highlights a prevalence of 30% of anxiety, 31.1% of depression, and 20.2% of PTSD [11]. However, high heterogeneity was found for all main analyses. Kunzler et al. [12] published a systematic review and meta-analysis a year later to assess the impact of the Covid-19-related pandemic on the mental health of the general public and specific at-risk groups such as healthcare workers, during the initial phase by comparing pandemic and pre-pandemic data. Meta-analyses showed no effect on key outcomes for healthcare workers during the pandemic compared with pre-pandemic. The authors postulate that due to chronic exposure to work-related risk in daily life, as a kind of stress inoculation, healthcare professionals may have learned effective strategies helping them to cope with crisis situations more professionally than other groups. Furthermore, the authors point out that the absence of evidence of effects of the Covid-19 pandemic on mental health among healthcare workers in this study does not necessarily mean evidence of no effects. Moreover, specifically for healthcare workers, the mental burden of individuals probably depends on the location of the survey (e.g. country, region) and the extent of the burden on the respective healthcare systems during the pandemic: of the 13 studies included in the meta-analyses concerning healthcare workers, only 2 studies concern a heavily affected country. The studies in the meta-analyses probably use different methodologies, different sampling methods, and with risks and public health measures specific to each country. Concerning the nursing homes, few authors explored psychological issues among workers [13–15]. The specificity of health professionals is that COVID-19 crisis alters not only their personal psychological health, but also their psychological health at work [16]. Psychological health at work has two aspects: psychological well-being at work (WW) and psychological distress at work (DW) [17,18].

People who experience WW feel serene and emotionally balanced; they appreciate their work and their achievements, and have the desire and ambition to get involved in their work; they also listen to others, feel appreciated and loved, and maintain good relationships with those around them at work. People who find themselves in a situation of distress at work (DW) no longer feel much interest in their work, feel diminished and useless, and have no desire to undertake projects. WW and DW thus appear to be distinct concepts, and inversely linked. Some authors show that optimism is a predictor of WW [19,20]. Thus, individuals who expect good things to happen to them tend to report more WW and less DW. Optimism, positively correlated with psychological

well-being and mental health, appears to be an important resource for coping with various stressful situations [21]. The COVID-19 situation, as a traumatic one, has had an impact on the general state of individuals as well as on how they perceive their evolution, both personally and professionally [22], and has completely altered the landscape of the work setting and relationship [23]. The Micheletto et al. study on the impact of optimism and internal locus of control on workers' well-being before and during the Covid-19 pandemic shows that, during the pandemic period, optimism helped reduce psychological distress and increase happiness, subjective well-being and feelings of personal fulfillment among workers [21]. Furthermore, looking to the future with confidence had a significant direct impact on well-being development, with a higher regression coefficient in 2020 ( $\beta = .61$ ) than in 2019 ( $\beta = .53$ ) [21]. Being optimistic and looking to the future positively can encourage a person to view their personal situation positively and feel better about themselves.

Although the relationship between work and psychological health is not yet fully understood, it is certain that work influences psychological health, and that psychological health affects the experience of work [24]. Indeed, psychological distress in the workplace is usually attributed to work-related variables as well as non-work-related variables. Stress occurs when the individual perceives that the demands of his environment exceed his ability to cope and, therefore, that his well-being is threatened [16]. Work can promote well-being and provide a means for satisfaction, improved quality of life and individual fulfillment [25].

In recent decades, several studies have shown that, despite the mental distress that follows exposure to different types of stressors or traumatic events, the presence of specific factors associated with resilience acts as protective agents and reduces the negative impact of the stressor on the psychological well-being of individuals [26–28].

This project aimed to measure the relationships between different psychological characteristics (anxiety, depression, PTSD, resilience) and to study how they influenced the quality of life and psychological health at work of staff in EHPAD and SHPL. We hypothesized that negative psychological phenomena (anxiety, depression and PTSD) would have an impact on the level of psychological health at work of exposed personnel. And this impact would be moderated by the resilience of the individuals.

## 2. Methods

### 2.1. The CHIANTI study

The CHIANTI study was an observational and longitudinal epidemiological survey using mixed methods. This research complies with the Helsinki declaration and was registered by the French National Commission for Computing and Liberties (CNIL) (n°2020-139).

Volunteer participants were recruited from health care facilities willing to participate in the study among the 114 EHPAD and 39 SHPL in Moselle. Therefore, the target population was all the health care professionals and other staff members (employees outside the care services) of these volunteer centers, meeting the following inclusion criteria: being over 18 years of age, being able to read and write (capable of understanding the information and completing the questionnaire independently), agreeing to participate in the project, being employed and/or working as healthcare staff, either full-time or part-time, in a nursing home (EHPAD) or a social and health establishment (SHPL) in the Moselle department, and having been active and present at their workplace during the confinement period.

### 2.2. Data collection

Volunteer participants received, via their management, an email invitation to take part in the study, along with an information letter outlining the project's objectives and a consent form. They were asked to answer a first online questionnaire (baseline questionnaire, M0), using the LimeSurvey software in spring 2021. The link to the follow-up questionnaires was sent at the various measurement points (M3, M6, M12—respectively 3, 6, and 12 months after the inclusion), through the email address provided by the participants during the initial questionnaire.

First questionnaires included questions about the respondent's sociodemographic characteristics as well as standardized questionnaires about their psychological health at work, resilience, anxiety and depressive, post-traumatic stress, and quality of life. Follow-up questionnaires, addressed the same domains, specifically mental health at work, resilience, anxiety and depression, post-traumatic stress, and quality of life

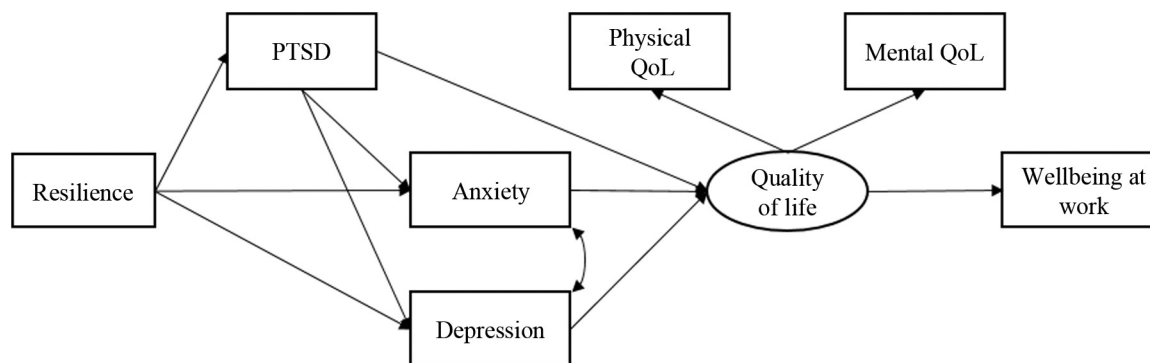
Psychological health at work was assessed using the SPT (*Santé Psychologique au Travail* in French) questionnaire [29], which measures two dimensions of psychological health at work using a total of 45 items: well-being at work (WW) and distress at work (DW). Three subscales compose the WW dimension: commitment at work (5 items), serenity (10 items), and social harmony (7 items), with Cronbach's alphas varying between 0.82 and 0.86 and were respectively 0.82, 0.88, 0.77 in our study. The DW dimension is composed of three other subscales: irritability and aggressiveness (7 items), anxiety and depression (9 items), and disengagement (7 items) with Cronbach's alphas varying between 0.85 and 0.91 and were respectively 0.84, 0.92, 0.91 in our study. WW is significantly and inversely related to DW ( $r = -0.66$ ,  $P < 0.01$ ) and correlations between WW and DW dimensions ranged from  $r = -0.61$  ( $P < 0.01$ ) to  $r = -0.41$  ( $P < 0.01$ ), corroborating the construct validity of this instrument. The higher the score, the higher the well-being or distress.

Resilience was assessed using the Brief Resilience Scale (BRS) [30,31] [for french version], a 6-item questionnaire aiming to assess resilience as a self-perceived ability to bounce back or recover quickly from stress. A higher score indicates a higher degree of resilience. The BRS in French version has a Cronbach's alpha equal to 0.84. It was 0.85 in our study.

Anxiety and depression were measured with the Hospital Anxiety and Depression Scale (HADS) [32,33] [for French version]. Seven items assess the level of anxiety and seven other items assess the level of depression. The internal consistency of the two scales is good: the Cronbach's alpha for the depression scale is 0.78 and the Cronbach's alpha for the anxiety scale is 0.81 and were respectively 0.83 and 0.80 in our study. A higher score indicates a higher level of anxiety or depression.

Post-traumatic stress disorder (PTSD) was measured using the PTSD Checklist Specific (PCLS) [34–37] [34,35 for french version], which is a 17 items self-report inventory to assess the severity of PTSD over the past month. It is composed of three subscales: re-experience (5 items), numbing (7 items) and hyper-arousal (5 items). With a PCLS cutoff score of 44 (as suggested by Blanchard et al. [38]), the sensitivity is 0.97, the specificity 0.87, and the overall diagnostic efficacy 0.94. A higher score indicates a higher severity of PTSD. The total score and the three subscales scores demonstrated satisfactory test-retest reliability: 0.80 for the total score, 0.82 for re-experiencing, 0.74 for numbing and 0.70 for hyper-arousal. The Cronbach's alpha is .86 for the PCLS total score in validation's paper and 0.94 in our study.

Finally, Quality of life (QoL) was assessed using the Short form 2 health survey (SF-12) [39–41] [for French version], a multidimensional scale which measures health status independently of sex, age, pathology and treatment. Eight subdimensions are assessed



**Fig. 1.** Theoretical model of the CHIANTI project. PTSD: Post-Traumatic Stress Disorder; QoL: Quality Of Life.

by this scale (physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health) and then aggregated into a Physical Composite Score (PCS) and a Mental Composite Score (MCS). Cronbach's alpha for SF-12 was 0.91 in our study. The higher the score, the better the health status.

All data generated or analyzed during this study is available as needed upon reasonable request.

### 2.3. Data analysis

Descriptive statistics of the responses were done using median and quartiles for continuous variables and count and percentage for categorical variables.

The theoretical model tested through path analyses was that depression, anxiety and PTSD, influenced by resilience, were associated with a poorer QoL, which in turn would be predictive of the psychological health at work (Fig. 1). Two analyses were performed, one for psychological DW and the other for psychological WW.

Path analyses were done on complete cases using maximum likelihood with robust standard errors (MLR) estimation to take into account issues in normality and homoscedasticity [42]. All variables were standardized to have their values from 0 to 100 in order to facilitate their interpretation and comparison (in particular to have standard deviations of the same magnitude).

Model fit was assessed using the root mean square error of approximation (RMSEA) as well as the comparative fit index (CFI). Good fit was defined as RMSEA < 0.05 and CFI > 0.9. Differences between observed and modeled correlations as well as modification indices were used to choose potential modifications in the model. A step-by-step improvement of the models was performed by adding or removing correlations or links between variables, according to these indicators. Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used to compare models. The significance level was set at 5%. Observations with missing values were excluded. Analyses were performed using R 4.1.0 [43] with the tidyverse 1.3.1 [44] and the lavaan 0.6–9 packages [42].

## 3. Results

### 3.1. Respondent and sample characteristics

Two hundred and thirty professionals answered the questionnaire at inclusion, 141 working in SHPL and 89 in EHPAD. Only differences for the seniority and for the professional category were observed between the two structures (supplementary Table S1). The median age was 44.0 years, with 192 (84%) female respondents. Due to incomplete observations, path analyses were performed on a sample of 130 observations. No significant difference was observed

between the study sample and those who were excluded due to missing data (Table 1). The correlation matrix of the analyzed variable for this sample is available Table 2.

### 3.2. Psychological well-being at work model

The initial model for psychological WW was successively improved first by adding a correlation between physical and mental QoL (suggested by modification indices), then by removing the path between PTSD and QoL (not significant), and finally removing the correlation between anxiety and depression (not significant).

The final model had a RMSEA of 0.0 and a comparative fit index (CFI) of 1.0, denoting a good goodness-of-fit, differences between observed and modeled correlations were all lower than 0.1 and no modification index was larger than 4. All paths and correlations were significant (Fig. 2 and Table 3). The higher the resilience score, the lower the PTSD, anxiety and depression scores. Anxiety and depression were negatively associated with QoL while QoL was positively associated with WW. Having a high level of resilience was associated with low PTSD ( $-0.80$  [95%CI:  $-0.93$ ;  $-0.67$ ];  $P < 0.001$ ), anxiety ( $-0.20$  [ $-0.37$ ;  $-0.03$ ];  $P = 0.022$ ) and depression ( $-0.29$  [ $-0.48$ ;  $-0.10$ ];  $P = 0.002$ ) scores. Higher scores of anxiety and depression were associated with low QoL (anxiety:  $-0.04$  [ $-0.07$ ;  $-0.00$ ];  $P = 0.03$  and depression:  $-0.13$  [ $-0.20$ ;  $-0.07$ ];  $P < 0.001$ ). Finally, a high score of QoL was associated with a high score of WW at work ( $2.55$  [ $1.48$ ;  $3.62$ ];  $P < 0.001$ ). Globally, according to the validated model and all else being equal, an increase of 10 points of resilience score may result in an indirect increase of 3 points of WW score.

### 3.3. Psychological distress at work model

The initial model for psychological DW was successively improved, first by adding a correlation between physical and mental QoL, then by adding a correlation between depression and psychological DW and finally by adding direct links between resilience and DW as well as between PTSD and DW.

The final model had a RMSEA of 0.0 and a CFI of 1.0, denoting a good goodness-of-fit, differences between observed and modeled correlations were all lower than 0.1 and no modification index was larger than 4 (Fig. 3 and Table 4).

The model of psychological distress was the same as the model of psychological well-being with the notable exception of two things. For this model of psychological distress, in addition to the indirect links, there were direct and significant links between resilience and PTSD and psychological DW.

Globally, according to the validated model, an increase of 10 points of resilience score may result in a decrease of 6 points of DW

**Table 1**  
Comparison of study sample and excluded sample (total, included in the analyses and excluded for incompleteness).

	Excluded for incompleteness (n = 100)	Study sample (n = 130)	Total (n = 230)	P
Type of health care facility				0.28 <sup>a</sup>
EHPAD	43 (43.0%)	46 (35.4%)	89 (38.7%)	
SHPL	57 (57.0%)	84 (64.6%)	141 (61.3%)	
Financing of the structure				0.86 <sup>a</sup>
Public	53 (62.4%)	78 (60.0%)	131 (60.9%)	
Private	28 (32.9%)	47 (36.2%)	75 (34.9%)	
Do not know	4 (4.7%)	5 (3.8%)	9 (4.2%)	
Missing values	15	0	15	
Age (years)				0.82 <sup>b</sup>
Median (Q1,Q3)	43.5 (33.0, 54.0)	44.0 (32.2, 53.0)	44.0 (33.0, 54.0)	
Sex				0.11 <sup>a</sup>
Female	88 (88.0%)	104 (80.0%)	192 (83.5%)	
Male	12 (12.0%)	26 (20.0%)	38 (16.5%)	
Marital status				0.68 <sup>a</sup>
Single	17 (17.0%)	21 (16.2%)	38 (16.5%)	
Married	42 (42.0%)	69 (53.1%)	111 (48.3%)	
Civil union	11 (11.0%)	13 (10.0%)	24 (10.4%)	
In couple	17 (17.0%)	17 (13.1%)	34 (14.8%)	
Separated	3 (3.0%)	2 (1.5%)	5 (2.2%)	
Divorced	8 (8.0%)	7 (5.4%)	15 (6.5%)	
Widowed	2 (2.0%)	1 (0.8%)	3 (1.3%)	
Total number of children				0.17 <sup>b</sup>
Median (Q1,Q3)	2.0 (1.0, 2.0)	2.0 (2.0, 2.0)	2.0 (2.0, 2.0)	
Missing values	31	41	72	
Number of dependent children in the household				0.76 <sup>b</sup>
Median (Q1,Q3)	2.0 (1.0, 2.0)	2.0 (1.0, 2.0)	2.0 (1.0, 2.0)	
Missing values	35	44	79	
Employment status				0.26 <sup>1</sup>
Part-time	11 (12.6%)	25 (19.2%)	36 (16.6%)	
Full-time	76 (87.4%)	105 (80.8%)	181 (83.4%)	
Missing values	13	0	13	
Seniority in the main structure (years)				0.73 <sup>b</sup>
Median (Q1,Q3)	10.0 (3.0, 20.0)	8.0 (3.2, 18.8)	9.0 (3.0, 19.0)	
Missing values	15	0	15	
Professional category				0.27 <sup>1</sup>
Hospital services agent	1 (1.3%)	1 (0.9%)	2 (1.0%)	
Logistics and technical services agent	0 (0.0%)	1 (0.9%)	1 (0.5%)	
Medical-psychological assistant	0 (0.0%)	2 (1.8%)	2 (1.0%)	
Caregiver	12 (15.6%)	15 (13.2%)	27 (14.1%)	
Animator	0 (0.0%)	4 (3.5%)	4 (2.1%)	
Executive	9 (11.7%)	23 (20.2%)	32 (16.8%)	
Director	10 (13.0%)	7 (6.1%)	17 (8.9%)	
Occupational therapist	0 (0.0%)	1 (0.9%)	1 (0.5%)	
Nurse	17 (22.1%)	31 (27.2%)	48 (25.1%)	
Physiotherapist	1 (1.3%)	0 (0.0%)	1 (0.5%)	
Physician	11 (14.3%)	15 (13.2%)	26 (13.6%)	
Administrative/secretary worker	9 (11.7%)	8 (7.0%)	17 (8.9%)	
Catering and hospitality worker	0 (0.0%)	1 (0.9%)	1 (0.5%)	
Pharmacist	2 (2.6%)	1 (0.9%)	3 (1.6%)	
Psychologist	5 (6.5%)	3 (2.6%)	8 (4.2%)	
Psychomotrician	0 (0.0%)	1 (0.9%)	1 (0.5%)	
Missing values	23	16	39	
Seniority in the profession (years)				0.52 <sup>b</sup>
Median (Q1,Q3)	12.0 (5.0, 23.2)	11.5 (5.0, 20.0)	12.0 (5.0, 21.8)	
Missing values	16	0	16	
Psychological well-being at work (WW; 0–100)				0.37 <sup>b</sup>
Median (Q1,Q3)	68.3 (63.3, 77.1)	68.4 (61.0, 75.1)	68.3 (61.9, 75.7)	
Missing values	38	0	38	
Psychological distress at work (DW; 0–100)				0.22 <sup>b</sup>
Median (Q1,Q3)	27.1 (15.9, 36.0)	29.0 (19.8, 41.4)	28.0 (19.0, 40.9)	
Missing values	47	0	47	
Resilience (BRS; 0–100)				0.59 <sup>b</sup>
Median (Q1,Q3)	54.2 (50.0, 66.7)	54.2 (38.5, 70.8)	54.2 (41.7, 70.8)	
Missing values	83	0	83	
Physical QoL (PCS; 0–100)				0.59 <sup>b</sup>
Median (Q1,Q3)	50.8 (42.4, 54.7)	52.1 (46.6, 55.7)	52.1 (46.5, 55.7)	
Missing values	84	0	84	
Mental QoL (MCS; 0–100)				0.12 <sup>b</sup>
Median (Q1,Q3)	46.0 (41.9, 49.4)	41.8 (35.7, 48.4)	42.6 (36.3, 48.4)	
Missing values	84	0	84	
Anxiety (HADS anxiety; 0–100)				0.27 <sup>b</sup>
Median (Q1,Q3)	31.0 (16.7, 41.7)	42.9 (28.6, 52.4)	42.9 (23.8, 52.4)	
Missing values	94	0	94	
Depression (HADS depression; 0–100)				0.61 <sup>b</sup>
Median (Q1,Q3)	28.6 (9.5, 38.1)	31.0 (14.3, 42.9)	28.6 (14.3, 42.9)	
Missing values	91	0	91	
PTSD (PCL-S; 0–100)				0.38 <sup>b</sup>
Median (Q1,Q3)	24.3 (12.5, 40.8)	26.5 (13.2, 48.1)	26.5 (12.9, 47.1)	
Missing values	86	0	86	

EHPAD: Residential facilities for the dependent elderly; SHPL: First Line Hospital Services, QoL: Quality of Life, PTSD: Post-Traumatic Syndrome Disorder.

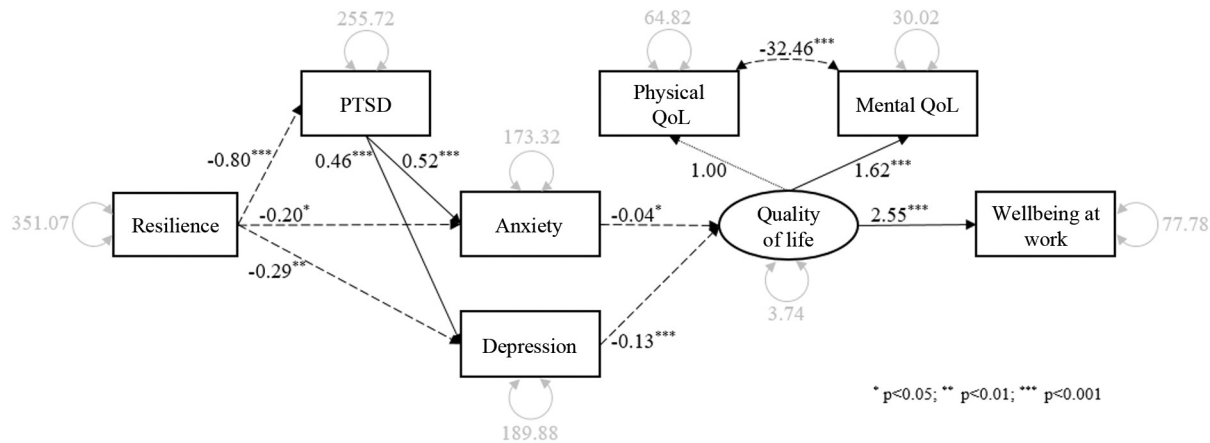
<sup>a</sup> Fisher's Exact test for count data.

<sup>b</sup> Kruskal-Wallis rank sum test.

**Table 2**  
Correlation matrix at T0 for complete observations (n = 130).

	Resilience	Mental QoL	Physical QoL	PTSD	Depression	Anxiety	WW
Resilience	1.00						
Mental QoL	0.50	1.00					
Physical QoL	0.18	-0.15	1.00				
PTSD	-0.68	-0.50	-0.25	1.00			
Depression	-0.62	-0.61	-0.35	0.70	1.00		
Anxiety	-0.59	-0.50	-0.22	0.72	0.60	1.00	
WW	0.50	0.53	0.31	-0.50	-0.62	-0.42	1.00
DW	-0.64	-0.57	-0.36	0.70	0.71	0.60	-0.81

Only the correlation between mental and physical QoL is not significant at 5%. QoL: Quality Of Life, PTSD: Post-Traumatic Stress Disorder, DW: Distress at Work, WW: Well-being at Work



**Fig. 2.** Path analysis of the associations between resilience and psychological well-being at work. PTSD: Post-Traumatic Stress Disorder; QoL: Quality Of Life.

**Table 3**  
Estimated (non-standardized) coefficients of the psychological well-being at work path analysis model.

	Coefficient	95% CI	P
<b>Paths</b>			
PTSD ~ Resilience	-0.80	(-0.93; -0.67)	<0.001
Anxiety ~ Resilience	-0.20	(-0.37; -0.03)	0.022
Depression ~ Resilience	-0.29	(-0.48; -0.10)	0.002
Anxiety ~ PTSD	0.52	(0.38; 0.66)	<0.001
Depression ~ PTSD	0.46	(0.29; 0.63)	<0.001
QoL ~ Anxiety	-0.04	(-0.07; -0.00)	0.030
QoL ~ Depression	-0.13	(-0.20; -0.07)	<0.001
WW ~ QoL	2.55	(1.48–3.62)	<0.001
<b>Latent variables</b>			
QoL ~ Physical QoL	1.00	(1.00; 1.00)	
QoL ~ Mental QoL	1.62	(0.65; 2.59)	0.001
<b>Correlations</b>			
Physical QoL ~ Mental QoL	-32.46	(-44.48; -20.44)	<0.001

y ~ x: y is regressed on x; y ~ x: latent variable y is measured by x; x ~ y: x is correlated with y. CI: Confidence Interval, PTSD: Post-Traumatic Stress Disorder, QoL: Quality of Life; WW: Well-being at Work.

(3 points due to indirect links, 1.5 due to direct association between resilience and DW and 1.5 due to direct link between PTSD and DW).

#### 4. Discussion

The results showed that psychological WW and psychological DW path models confirmed the theoretical model, i.e., resilience impacts the psychological state of professionals, which in turn affects psychological health at work and this impact was different between WW and DW. Indeed, resilience seems to be strongly associated with psychological conditions such as PTSD. Other studies have shown similar results [45]. Concerning more specifically the model for WW, no direct link between negative psychological state (measured by levels of anxiety, depression, and PTSD) and WW was found, but this relationship seems to be mediated

by QoL level. However, a direct link between PTSD and psychological DW was observed. Furthermore, QoL, itself impacted by psychological state and modulated by resilience capacity, played a dominant role in the level of WW and psychological DW. So, we cannot say that WW and DW are on the same continuum of the same concept. According to Gilbert [29], these two notions are distinct concepts, inversely linked. Indeed, our results concerning the relationship between resilience, psychological well-being at work and psychological distress at work are consistent with those of Bouterfas in his thesis [46]. Resilience proved to be a good predictor of psychological well-being (r = 0.57, P < .001) and had a negative impact on psychological distress (r = -0.42, P < .001). Psychological health at work is a multidimensional construct, comprising a positive dimension (psychological well-being at work) and a negative dimension (psychological distress at work), each composed

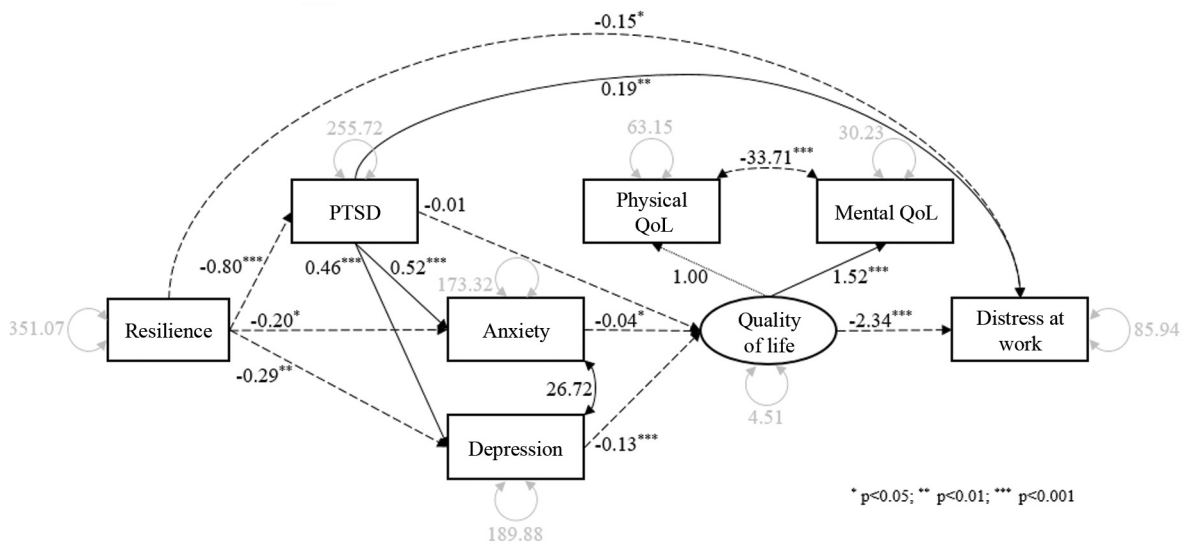


Fig. 3. Path analysis of the associations between resilience and psychological distress at work. PTSD: Post-Traumatic Stress Disorder; QoL: Quality Of Life.

Table 4  
Estimated (non-standardized) coefficients of the psychological distress at work path analysis model.

	Coefficient	95% CI	P
<b>Paths</b>			
PTSD ~ Resilience	-0.80	(-0.93; -0.67)	<0.001
Anxiety ~ Resilience	-0.20	(-0.37; -0.03)	0.022
Depression ~ Resilience	-0.29	(-0.49; -0.10)	<0.001
Anxiety ~ PTSD	0.52	(0.38; 0.66)	<0.001
Depression ~ PTSD	0.46	(0.29; 0.63)	<0.001
QoL ~ PTSD	-0.01	(-0.05; 0.03)	0.725
QoL ~ Anxiety	-0.04	(-0.08; -0.01)	0.042
QoL ~ Depression	-0.13	(-0.20; -0.07)	<0.001
DW ~ QoL	-2.34	(-3.30; -1.38)	<0.001
DW ~ PTSD	0.19	(0.06; 0.31)	0.004
DW ~ Resilience	-0.15	(-0.28; -0.02)	0.027
<b>Latent variables</b>			
QoL ~ Physical QoL	1.00	(1.00; 1.00)	
QoL ~ Mental QoL	1.52	(0.62; 2.42)	0.001
<b>Correlations</b>			
Anxiety ~ Depression	26.72	(-5.74; 59.18)	0.107
Physical QoL ~ Mental QoL	-33.71	(-46.19; -21.22)	<0.001

y ~ x: y is regressed on x; y = ~ x: latent variable y is measured by x; x ~ y: x is correlated with y. CI: Confidence Interval; PTSD: Post-Traumatic Stress Disorder; QoL: Quality of Life; DW: Distress at Work.

of positive and negative indicators, focused on both the individual (personal resources such as resilience, optimism) and the work environment (socio-organizational resources such as work climate, organizational justice, and job demands) [47–49]. A low level of psychological well-being at work is not necessarily accompanied by a high level of psychological distress at work, and vice versa.

If the influence of optimism on psychological well-being at work is clearly evident in our results, it is nevertheless important to qualify this relationship by considering the temporal context in which the data were collected. Indeed, the measurements were taken in the spring of 2021, after the first wave of the pandemic and at a time when vaccination programs were beginning to be rolled out. This context may have fostered a more positive perception of the future, thereby influencing the reported levels of optimism. During times of crisis, optimism can be shaped by contextual and fluctuating factors rather than being solely a stable personality trait [50,51]. It is therefore possible that this optimism partially reflects post-crisis relief or an anticipation of a gradual exit from the pandemic situation rather than a lasting state.

This temporal bias may have attenuated the relationships between perceived stress factors and psychological distress or,

conversely, amplified the perceived protective effect of optimism. Optimism has been shown to be a key factor in resilience during health crises, although it can be modulated by the immediate environment and risk perception [52]. Future research should take this type of bias into account by increasing measurement points and incorporating contextual variables (periods of stability vs. peaks of infection) to better distinguish transient effects from more stable psychological mechanisms.

#### 4.1. Implications

Resilience is an individual adaptive resource that allows us to face the challenges that life imposes on us [53]. The capacity for resilience delimits and explains, at least in part, how individuals are or are not able to draw from the depths of their being the psychological and physical forces that can help them to overcome or not the ordeals they have been confronted with, as was the case with the health crisis. We must not lose sight of the fact that, despite these ordeals, most of these professionals stood their ground and responded throughout the crisis. They have not avoided or bypassed the trials that the health crisis has brought to their

work, but have faced and fought them. And it is because of their courage and their willingness to fight the deleterious effects of the virus that they themselves were impacted in their personal and professional integrity. We cannot act directly on the resilience of individuals, because it is not a skill or a resource that can be stretched to infinity. However, our results suggest that it is possible to act on its preservation, thus making it possible to restore a certain equity between individuals by acting on other psychological factors such as anxiety, depression or PTSD, which are factors strongly associated with the resilience score. Indeed, it is possible to act on the intensity of these psychopathological dimensions, the reduction of which could either maintain the capacity for resilience or prevent it from deteriorating irreparably. Such a result opens up concrete avenues of intervention and care for these employees. Institutional benevolence, salary increases or adjustments to working hours [11], even if they help to reduce stress linked to working conditions [54], will not be enough to regulate the psychopathological basis of depression, anxiety or PTSD. It will be necessary to propose individual and targeted psychotherapeutic care for these front-line health professionals, such as “psychological first aid” or “Eye movement desensitization and reprocessing” in early treatment or interventions focused on resilience [55,56], both to prevent psychological DW and to promote WW [57,58].

Beyond interventions targeting professionals' individual resources, such as resilience or coping strategies, greater attention must be paid to the structural dimensions of work in the context of a health crisis. The observed psychological distress cannot be exclusively interpreted as a reflection of individual vulnerability; rather, it occurs within a work environment marked by significant organizational constraints, including chronic overload, service disorganization, lack of equipment, constant redefinition of tasks, and sometimes deficient hierarchical communication [59]. These factors, which fall under systemic responsibility, directly contribute to the erosion of internal psychological resources, particularly resilience [60].

It is therefore essential to approach mental health prevention through a dual perspective: supporting individuals, of course, but also transforming organizations. This involves strengthening institutional psychological support mechanisms, ensuring fair and transparent human resource management, preserving spaces for collective regulation (such as discussion groups and supervision), and promoting a managerial culture based on recognition, participation, and listening [61]. Such an integrated approach, combining individual and systemic levers, is essential to preventing professional burnout and fostering a genuine climate of psychological well-being at work [62].

#### 4.2. Study strengths and limitations

The main limitation of this study is its low number of participants, which can be explained in several ways: first of all, by the health context in which the project was launched in the spring of 2021. The staff, both nursing and non-medical, of the EHPAD and SHPL were then very strongly mobilized in the management of the health crisis and were not willing to answer the CHIANTI survey. Moreover, the first vaccination campaign was launched at the same time as the study, which mobilized the staff even more. In addition, this pandemic, with knowledge of how to manage and contain covid-19 growing over time, could have influenced some of the psychological variables measured. Finally, the survey was sent to the staff by their management, which may have caused a desirability bias on the part of the respondents. To address this limitation in future research, we suggest using direct contact with posters in healthcare facilities, which would reduce the risk of social desirability bias and encourage more honest responses. Additionally, we recognize that the voluntary nature of participation might have

introduced a selection bias, as those more motivated to respond might differ from those who chose not to participate. We note this as a limitation in the generalizability of our results. Lastly, the conditions under which the questionnaires were completed—whether at home or at the workplace—could have influenced the responses. Future studies could control for these factors or include them as variables in the analysis to assess their potential impact. Another limitation is the amount of missing data. Indeed, 100 participants were excluded from the analyses for this reason. However, the results showed no statistically differences between participants excluded for incompleteness and the study sample on any of the variables measured.

Finally, a major originality of this study is the inclusion of non-healthcare and health-care personnel from EHPAD and hospital services. Most studies focus on nursing staff. However, non-healthcare workers remain important populations who have mobilized a great deal during this crisis and who deserve to have the psychological and physical costs of their professional commitments assessed.

In summary, the findings of this study confirm that employees' well-being and distress at work are influenced by their overall quality of life, which is in turn affected by anxiety, depression, resilience, and post-traumatic syndromes. Resilience appears to play a significant role in the development of psychological disorders such as post-traumatic stress disorder and anxiety-depressive disorders. Addressing anxiety, depression, and trauma-related symptoms may help enhance resilience and ultimately promote overall well-being and quality of life in the workplace. It is imperative to implement individualized and targeted psychotherapeutic interventions to prevent work-related psychological disorders and support employees' mental health. Additionally, raising awareness among management about work-related psychopathology and providing tailored support could be beneficial in identifying and addressing signs of distress in the workplace.

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#### Disclosure of interest

The authors declare that they have no competing interest.

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#### Online supplement. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.encep.2025.04.004>.

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