Research Article

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Risk perception and affective state on work exhaustion in obstetrics during the COVID-19 pandemic

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Abstract: A multicenter cross-sectional survey study involving four Italian University Hospitals was performed to test the hypothesis that negative affect and positive affect (affective dimensions) mediate the association between risk perception (perceived risk of infection and death; cognitive dimensions) and the feeling of work exhaustion (WE) among obstetrics healthcare providers (HCPs) during the Coronavirus Disease 2019 (COVID-19) pandemic. Totally, 570 obstetrics HCPs were invited to complete the 104-item IPSICO survey in May 2020. A theoretical model built on the tested hypothesis was investigated by structural equation modelling. The model explained 32.2% of the WE variance. Only negative affect mediated the association between cognitive dimensions and WE and also the association between WE and psychological well-being before the pandemic, experiences of stressful events, female gender, and dysfunctional coping. Non-mediated associations with WE were observed for work perceived as a duty, experience of stressful events, support received by colleagues, and the shift strategy. Only previous psychological well-being, support by colleagues, and shift strategies were inversely associated with WE. Based on study results, monitoring negative than positive affect appears superior in predicting WE, with practical implications for planning psychological interventions in HCPs at the individual, interpersonal, and organizational levels.

Keywords: health personnel, COVID-19, obstetrics, affect, burnout, professional

1 Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-COV2) emergency led to high emotional distress among healthcare providers (HCPs). High levels of anxiety, depression, and distress have been observed in HCPs involved in the first pandemic wave [1–8]. In this scenario, obstetricians and gynecologists have been described as having a noticeable risk for work-related emotional distress both before [9,10] and after [11] the SARS-COV2 widespread. During the pandemic, obstetrics HCPs, indeed, faced peculiar challenges, including initial uncertainties on vertical transmission, limited rescheduling of obstetrics care, assistance of COVID-positive women during labor, impossibility

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to involve patients' partners, and an increased rate of intrauterine fetal death [12–18]. Recent work from our group has shown a high level of distress during the pandemic in a sample of Italian obstetrics HCPs [19]. The distress was associated with either individual (female gender, stressful experience related to the pandemic, dysfunctional coping strategies), interpersonal (lower family support, limitations in interactions with colleagues), or organizational (low perceived protection by personal protective equipment, perceived delays on updates and information on the pandemic) factors.

Distress may translate into feelings of fatigue, irritability, frustration, and wearing out commonly summarized in the term "emotional exhaustion" [20]. These work-related feelings of exhaustion represent a core dimension of burnout [21]. They have been described in HCPs in general [22–26] and also in obstetrics [27–32], with higher prevalence during and after the pandemic [6,33]. Understanding the factors affecting HCPs' risk for exhaustion is crucial to supporting HCPs by adopting ad hoc interventions to maintain the quality of healthcare [34]. However, to our knowledge, no study has specifically formulated a model to investigate work exhaustion (WE) concerning the peculiarity of the SARS-COV2 pandemic in HCPs working in obstetrics. On that basis, the present study aimed to formulate and test an explicative model investigating the joint variables hypothesized to be associated with the feeling of WE during the Coronavirus Disease 2019 (COVID-19) emergency in the obstetric context. We considered both cognitive and emotional dimensions, along with socio-demographic and COVID-19-related contextual factors. Few studies investigated the interaction of these aspects during the COVID-19 pandemic in the general population [35–37] and WE among HCPs [26,38].

Regarding the cognitive dimension, risk perception has been reported to be crucial during a sanitary emergency [35,39,40]. Risk perception represents a subjective dimension concerning the perceived chance of suffering damage related to predictable situations and is related to objective characteristics of the event (the event probability and the potential magnitude of damage [41]) and contextual factors [40]. Concerning the emotional dimension during the COVID-19 pandemic, affect was reported to have a prominent role in modulating behaviors in the general population [35] as well as mediating the effects of resilience on burnout, emotional exhaustion, depersonalization, and reduced personal accomplishment of frontline nurses [38]. Affect is defined as a psychological state, referring to personal evaluative feelings for objective things, and is composed of two independent dimensions, negative affect and positive affect [42].

The aim of the present study was to test the hypothesis that negative affect and positive affect (affective dimensions) mediate the association between risk perception (perceived risk of infection and death; cognitive dimensions) and the feeling of WE. More specifically, we expected negative affect to be associated with higher WE, whereas positive affect with lower WE. This hypothesis was partially confirmed by the model that supported the expected mediating role between risk perception and the feeling of WE only for the negative affect.

2 Methods

2.1 Study population and study design

Target responders were all HCPs (gynecologists, residents in gynecology and obstetrics, and midwives) working at four Italian University Hospitals (the University of Verona, the Catholic University of the Sacred Heart of Rome, the University of Insubria, and the University of Brescia), totalling 570 obstetrics HCPs. HCPs were invited by e-mail to complete the "Impatto PSIcologico COVID-19 in Ostetricia" (IPSICO) survey between May 15 and May 31, 2020. The invitation e-mail included a study presentation and the link to the survey to be filled via a web-based platform after providing consent for study participation. Each center provided the complete list of institutional e-mail addresses of target responders. The survey was in the Italian language.

Ethical approval: The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The study was approved (2020-UNVRCLE-0143469) by the human research ethics committee of the University of Verona (CARU, Comitato di Approvazione della Ricerca sull'Uomo). Participation was voluntary and anonymous; no demographic or personal information able to identify the responder was collected. HCPs were free to participate or not participate, and no remuneration was offered to respondents. HCPs were reminded up to three times by e-mail to participate. Consent was asked from each participant at the beginning of the survey using the web-based platform, and it was necessary to complete the survey. All included participants gave consent for study participation and anonymized data collection and analysis for research purposes. At any time, participants could terminate the survey if they desire.

2.2 The IPSICO survey

The IPSICO survey was designed by a panel of clinical psychologists, trainees, specialty tutors, and medical educationalists in obstetrics and gynecology at the University of Verona. The survey resulted in 104 items investigating socio-demographic and professional characteristics of obstetrics HCPs, risk appraisal along with perceived social support and coping strategies, perceived organizational support and changes in the work organization and climate, emotional impact of COVID-19, and COVID-19 impact on the professional life along with a measure of psychological distress. The survey was composed of validated psychological questionnaires and items tailored to obstetrics practice and COVID-19 experience.

Risk perception was investigated using two 1–10 Likert-scale variables: "Perceived risk of being infected" and "Perceived risk of death in case of infection." The level of positive and negative emotions in HCPs during the pandemic was assessed using the Italian version of the Positive and Negative Affect Schedule [43], which showed good psychometric properties [44]. The coping strategies were explored using the Italian validated version of the Brief Coping Orientation to Problems Experienced questionnaire [45,46].

Other new items were developed to explore socio-demographic characteristics and contextual factors related to COVID-19. Socio-demographic variables included age, gender, marital status, family composition, presence of old parents, professional role, and years of work. Using categorical variables (i.e., yes and no), the survey evaluated whether participants underwent a quarantine period, experienced a period of self-isolation, or experienced stressful events related to and unrelated to COVID-19. Moreover, categorical variables were used to investigate adopting a shift strategy and the availability of organizational and clinical protocols to deal with the emergency problem.

All other variables regarding the individual (i.e., psychological wellbeing before COVID-19; level of professional satisfaction before the pandemic), interpersonal (i.e., support received by family, friends, trustworthy people, and colleagues; changes in the rules of interaction with colleagues and in the quality of relationship with patients), and organizational (i.e., the efficacy of patient triage on admission; the utility of the shift strategy; receiving timely and complete information on the pandemic; reduction in the quality of obstetric service and change in perceived obstetric risk; level of involvement as an active part in the reorganization) factors have been self-evaluated by HCPs on a 10-point Likert scale ranging from 1 ("not at all") to 10 ("extremely").

Finally, the respondents were asked to select the aspects related to the greatest stress during COVID-19, the factors associated with a sense of security, the prevailing sensations in the relationship with the patient, and the prevalent feelings toward colleagues. Respondents could give more than one answer selecting the most corresponding ones to their personal experiences.

Further details of the IPSICO questionnaire are reported and described elsewhere [19,47].

2.3 Outcomes

The primary outcome was the presence of a feeling of work exhaustion (WE) during the COVID-19 pandemic. The feeling of WE was assessed by a composite outcome obtained by adding the scores of three 1 (not at all) – 10 (a lot) Likert-scale outcome variables included in the IPSICO survey: "I felt exhausted by my job during this pandemic," "How much did you perceive the weight of your professional role during this pandemic?," and "How much did you consider to abandon your professional role during this pandemic?" The three variables were formulated ad hoc for the IPSICO survey and adapted to the specific context of the pandemic. The feeling of exhaustion (either physical or emotional) is based on the item that best loads the WE dimension in the factorial analysis of the Italian version [48] of the Maslach Burnout Inventory [20] and the Professional Fulfillment Index [49]. Schaufeli et al. [50] also showed that exhaustion best discriminates between burned-out and non-burned-out employees using the Maslach Burnout Inventory and the Burnout Measure [51]. Finally, the weight of the professional role and the idea of abandoning work have already been related in a recent study linking turnover intention and WE [52].

The reliability of the three variables of outcomes in investigating the same construct was assessed using Cronbach's alpha. After defining the primary outcome, we explored potentially associated factors and developed a pivotal model by examining the relationships between WE and the variables included in the IPSICO survey.

2.4 Statistical analysis

All IPSICO questionnaires were included in the analysis with no application of a priori exclusion criteria. Standard descriptive statistics were used to describe the feeling of WE, affective and risk dimensions, coping strategies,

socio-demographic characteristics, and contextual factors of the study population.

Generalized linear regression models were adopted to investigate whether socio-demographic characteristics, contextual factors, and coping strategies of the study population (independent variables) were univariately associated with WE, and the perceived risk and affective dimensions (dependent variables). Generalized linear regression models were further used to investigate the univariate association between WE and the perceived risk and affective dimensions. The associations between risk perception and affective dimensions were investigated by the Spearman correlation. Variables univariately associated with WE were included in a multivariable generalized linear regression model, which was developed starting with a backward stepwise selection to eliminate less relevant variables and then using a hierarchical method for the final choice of predictors. The final model was selected based on the corrected Akaike information criterion.

Starting from the defined multivariable generalized linear regression model predicting WE and observed univariate associations, we developed and proposed a theoretical model based on our study hypothesis. To test the proposed theoretical model, structural equation modeling by path analysis with *R* was adopted. Standardized root-mean-square residual (SRMR) was used as a measurement of model fit.

All reported *p*-values were two-sided, and significance was considered at $p < 0.05$. Data analyses were performed using *R* and IBM SPSS Statistics 23.0, Armonk, NY.

3 Results

3.1 WE

Out of the 570 invited HCPs, 503 answered the IPSICO survey and 481 (response rate of 84.4%) responded to all three variables of the primary outcome (WE). Half of the HCPs reported a score of 6 (1–10) or higher (median 6; IQR 4–7) for the factor "feeling of being exhausted by my job during this pandemic." A score of 5 (1–10) or higher was reported by half of the responders (median 5; IQR 3–7) for the factor "weight of the professional role during this pandemic." Conversely, to the question "How much did you consider to abandon the professional role during this pandemic?," most HCPs in obstetrics answered 1 (median 1; IQR 1–2). WE had a median of 11 (IQR 8–16) and a mean of 12.16 (SD 5.8). Cronbach's alpha of 0.735 indicated a satisfactory internal consistency of the three variables composing the outcome in our sample.

3.2 Sociodemographic characteristics and the psychological impact on the cognitive and affective dimensions and WE

Table 1 reports descriptive statistics of socio-demographic characteristics and univariate regression coefficients for each target variable. University hospital was the unique factor associated with the perceived risk of infection. All socio-demographic characteristics but university hospitals were associated with the perceived risk of death if infected. Older females, separated, widowed, having young children, or living with old parents reported a higher perceived risk of death in the case of infection. The Positive Affect Score (PAS) was associated with personal characteristics, such as professional role, family composition, marital status, and university hospital. Only gender and professional role were associated with the Negative Affect Score (NAS), with females and midwives reporting higher NAS than males and doctors. WE was associated with age, professional role, and University. Tables S1 and S2 report details regarding the components of NAS and PAS, respectively.

3.3 Contextual factors and the psychological impact on the cognitive and affective dimensions, and WE

Table 2 reports the descriptive statistics of individual, interpersonal, and organizational factors along with univariate regression coefficients for each target variable. Perceived risk of infection was higher among HCPs in obstetrics who experienced a quarantine period or a stressful event related to COVID-19. Conversely, the perceived risk of infection decreased with perceiving a higher efficacy of triage for COVID-19 at patient admission and with timely and complete information on the pandemic. HCPs who perceived a higher risk of infection reported a higher perceived change in obstetric risk and quality in the relationship with patients. Perceived risk of death in the case of infection was associated with the entity of perceived support from friends and colleagues. Increased support reduced the perceived risk of death. Conversely, the perceived risk of death increased with the perceived change in obstetric risk.

PAS and NAS were associated with multiple factors. Both affect scores were associated with the perceived efficacy of personal protective equipment and triage at patient admission, the entity of perceived support from friends and teamwork, and the receiving of timely and complete information on the pandemic. For all of these factors, PAS

Table 1: Socio-demographic characteristics of the entire population and generalized linear model regression coefficients (β)

Variable	Descriptive	Perceived RISK of being infected (β)	Perceived RISK of death in case of infection (β)	PAS (β)	NAS (β)	Composite outcome (WE) (β)
Age (median, IQR; mean, SD)	34 (29–46); 37.8 (10.78)	0.001	**0.07***	0.138	−0.015	**0.025***
Gender (*n*, %)						
Female	421 (83.7)	0.161	**−0.476***	−0.813	**2.143***	0.982
Marital status (*n*, %)						
Married/Cohabitant	278 (55.3)	0.451	**−1.1***	−2.317	0.011	0.850
Separated/Widowed	20 (4.0)	Ref	Ref	Ref	Ref	Ref
Unmarried	205 (40.8)	0.367	**−1.82***	**−3.899***	−0.428	0.263
Family composition (*n*, %)						
Single	112 (22.3)	Ref	Ref	Ref	Ref	Ref
Couple	124 (24.7)	−0.145	−0.206	−0.09	−1.348	−0.350
Couple with children	195 (38.8)	0.096	**0.760***	**1.824***	0.703	0.397
Two or more adults not familiar	72 (14.3)	−0.146	−0.193	0.028	−1.063	−0.806
Presence of old parents	38 (7.6)	0.003	**0.808***	−0.740	0.597	−0.168
Professional Role (*n*, %)						
Specialized doctor	143 (28.4)	−0.196	0.207	0.503	**−1.833***	**−1.893***
Trainee doctors	169 (33.6)	−0.347	**−0.986***	**−3.317***	**−2.143***	−1.007
Midwife	191 (38.0)	Ref	Ref	Ref	Ref	Ref
Years of work experience in the current role (median, IQR; mean, SD)	5 (2–18); 10.74 (10.52)	0.007	**0.063***	**0.131***	0.006	
University hospital (*n*, %)						
Brescia (Ref No)	185 (36.8)	**0.546***	−0.176	**3.487***	0.022	−1.3
Rome (Ref No)	111 (22.1)	−0.120	−0.353	**2.443***	−1.705	−1.472
Varese (Ref No)	82 (16.3)	0.251	−0.154	1.283	−1.769	**−2.602***
Verona (Ref No)	125 (24.9)	Ref	Ref	Ref	Ref	Ref

IQR = Interquartile range; SD; standard deviation; COVID-19 = Coronavirus disease 2019; Ref = Reference; WE (work exhaustion); *$p < 0.05$.

and NAS had the opposite association. Additionally, PAS was positively associated with the perceived support from family and colleagues, the entity of involvement in the reorganization of activities, and professional satisfaction and duty. NAS was higher among HCPs who experienced stressful events, regardless of the association with COVID-19 and underwent quarantine or self-isolation. NAS was positively associated with perceived changes in obstetric risk, quality of obstetric service, quality of interaction with patients, and quality of interaction with colleagues.

WE was associated with multiple contextual factors. Twelve out of 16 associated factors were shared with NAS and had the same direction. The primary outcome and NAS had a similar association with the experience of stressful events and self-isolation, perceived support from friends and teamwork, all contextual factors describing the impact of COVID-19 on professional and work life, the perceived efficacy of triage for COVID-19, the availability of organizational and clinical protocols, and the receiving of timely and complete information. WE was lower among HCPs in obstetrics who perceived higher support from colleagues, who worked in centers where a shift strategy was adopted, and who had higher professional satisfaction before the pandemic. Conversely, facing work, because it is a duty, increases the feeling of exhaustion at work.

3.4 Coping strategies and psychological impact on risk dimension, affective dimensions, and WE

Table 3 reports the descriptive statistics of coping strategies and univariate regression coefficients for each target variable. Emotion-focused coping was positively associated with PAS and NAS. Problem-focused coping was positively associated with the perceived risk of death in case of infection, and the positive association with PAS

Table 2: Contextual factors of the entire population and generalized linear model regression coefficients (β)

Variable	Descriptive	Perceived risk of being infected (β)	Perceived Risk of death in case of infection (β)	PAS (β)	NAS (β)	Composite outcome (WE) (β)
Underwent a quarantine period (*n*, %)	51 (10.1)	**0.671***	0.460	1.213	**2.603***	−0.057
Experienced a period of self-isolation (*n*, %)	162 (32.2)	0.211	−0.115	0.438	**2.364***	**1.217***
Experience of stressful events related to COVID-19 (*n*, %)	261 (51.9)	**0.775***	0.305	0.806	**4.926***	**3.498***
Experience of stressful events NOT related to COVID-19 (*n*, %)	118 (23.5)	−0.074	0.231	−0.038	**2.707***	**2.928***
Perceived protection from PPE (median, IQR)	5 (3–7)	−0.073	0.014	**0.797***	**−0.305***	−0.104
Support received from my family (median, IQR)	8 (5–10)	0.021	0.014	**0.299***	−0.015	−0.096
Support received from friends and trustworthy people (median, IQR)	7 (5–9)	0.011	**−0.088***	**0.412***	**−0.420***	**−0.378***
Institutional support						
Perceived efficacy of triage for COVID-19 at patient admission (median, IQR)	5 (3–7)	**−0.207***	−0.05	**0.483***	**−0.530***	**−0.359***
Adoption of a shift strategy to ensure adequate rest and staff always available (*n*, %)	333 (66.2)	−0.155	0.044	0.293	−1.182	**−2.084***
Availability of organizational and clinical protocols to deal with the emergency problem (*n*, %)	435 (86.5)	−0.474	−0.311	0.894	**−3.336***	**−2.448***
To what extent you received timely and complete information on the pandemic in order to be able to deal with it adequately (median, IQR)	6 (4–7)	**−0.126***	−0.022	**0.544***	**−0.405***	**−0.440***
Perceived level of involvement as an active part in the reorganization of the activities to deal with the emergency (median, IQR)	6 (3–7)	0.026	0.022	**0.946***	−0.167	0.052
Impact of COVID-19 on professional and work life						
Changes in perceived obstetric risk with increased risk of contagion (median, IQR)	5 (3–6)	**0.111***	**0.089***	0.146	**0.712***	**0.638***
Perceived reduction in the quality of your obstetric service (median, IQR)	4 (2–6)	0.008	−0.007	−0.116	**0.703***	**0.622***
How much the rules of interaction with colleagues influenced the quality of work (median, IQR)	5 (3–7)	0.021	0.053	−0.155	**0.386***	**0.391***
To what extent the quality of the relationship with the patients has changed (median, IQR)	5 (3–7)	**0.119***	0.042	0.072	**0.562***	**0.547***
Values and dedication to work						
Level of satisfaction of the profession before the pandemic (median, IQR)	7.5 (6.25–8)	−0.031	−0.015	**1.133***	−0.330	**−0.352***
I have faced work in this period because it is my duty (median, IQR)	8 (6–9)	0.047	0.034	**0.450***	0.233	**0.397***
Changes in the working climate						
Entity of perceived support by colleagues who play the same role during the pandemic (median, IQR)	7 (6–8)	−0.038	**−0.122***	**0.623***	−0.258	**−0.500***
Entity of perceived support by the team during the pandemic (median, IQR)	7 (5–8)	−0.071	−0.06	**0.681***	**−0.313***	**−0.588***

IQR = Interquartile range; COVID-19 = Coronavirus disease 2019; Ref = Reference; WE (work exhaustion); * $p < 0.05$.

Table 3: Coping strategies in the entire population and generalized linear model regression coefficients (β)

Variable	Descriptive (median, IQR; mean, SD)	Perceived RISK of being infected (β)	Perceived RISK of death in case of infection(β)	PAS (β)	NAS (β)	Composite outcome (WE) (β)
Emotions focused coping	22 (20–25) 22.46 (4.46)	0.037	0.029	**0.502***	**0.240***	0.087
Problems focused coping	17 (14–19) 16.51 (3.42)	0.046	**0.049***	**0.964***	**0.323***	0.125
Dysfunctional coping	21 (18–24) 21.38 (4.31)	**0.057***	**0.052***	−0.076	**0.749***	**0.371***

WE (work exhaustion); * $p < 0.05$.

and NAS. Emotion and problem-focused coping reported a higher association with PAS than NAS. Dysfunctional coping was the unique coping strategy associated with WE. Higher use of dysfunctional coping was associated with a higher feeling of exhaustion at work. Moreover, dysfunctional coping was positively associated with NAS, the perceived risk of infection, and the perceived risk of death. No significant association was observed with PAS. Table S3 reports the details on the components of dysfunctional coping.

3.5 Association between WE and independent variables

Table S4 reports the descriptive statistics of risk and affective dimensions, zero-order correlations between them, and generalized linear model regression coefficients for WE. Feeling of exhaustion at work was positively associated with the perceived risk of infection and death in the case of infection and NAS. Conversely, it was inversely associated with psychological well-being before the COVID-19 pandemic.

Variables univariately associated with WE were included in a multivariable generalized linear regression model (Table 4). Factors having an independent positive association with WE were NAS (0.292 increase per 1 point of score in NAS), the experience of stressful events related (1.619 in the case of stressful events) and nonrelated (1.550 in case of stressful events) to COVID-19, the perception of work as a duty (0.338 of increase per 1 point of score in agreement with perceiving work as a duty), and dysfunctional coping (0.127 of increase per 1 point of score in dysfunctional coping). On the other hand, the adoption of a shift strategy (−1.608 among those who adopted a shift strategy) and the perceived support by colleagues (−0.405 decrease per 1 point of score in perceived support by colleagues) had a negative independent association with feelings of WE.

3.6 Path analysis

Based on the study hypothesis, the multivariable generalized linear regression model, and previous analysis, we developed and proposed the theoretical model, as shown in Figure 1a. Cognitive risk factors are proposed as dependent on socio-demographic characteristics and associated with the feeling of WE during the pandemic mediated by the NAS. NAS is proposed as mediating the association with WE for cognitive risk factors, gender, the experience of self-isolation/quarantine, psychological well-being before

Table 4: Multivariable generalized linear regression model of factors evaluated for an association with the primary outcome (WE)

Variable	Level	β (95% CI)	p-value
NAS	Per 1 point of score	0.292 (0.222, 0.361)	<0.001
Entity of perceived support by colleagues who play the same role during the pandemic	Per 1 point of score	−0.405 (−0.604, −0.206)	<0.001
I have faced work in this period because it is my duty	Per 1 point of score	0.338 (0.175, 0.501)	<0.001
Adoption of a shift strategy to ensure adequate rest and staff always available	Yes	−1.608 (−2.506, −0.710)	<0.001
Experience of stressful events related to COVID-19 (n, %)	Yes	1.619 (0.724, 2.515)	<0.001
Experience of stressful events NOT related to COVID-19 (n, %)	Yes	1.550 (0.545, 2.554)	0.002
Dysfunctional coping	Per 1 point of score	0.127 (0.017, 0.236)	0.023
Intercept		6.282 (3.622, 8.942)	<0.001

$R^2 = 0.322$.

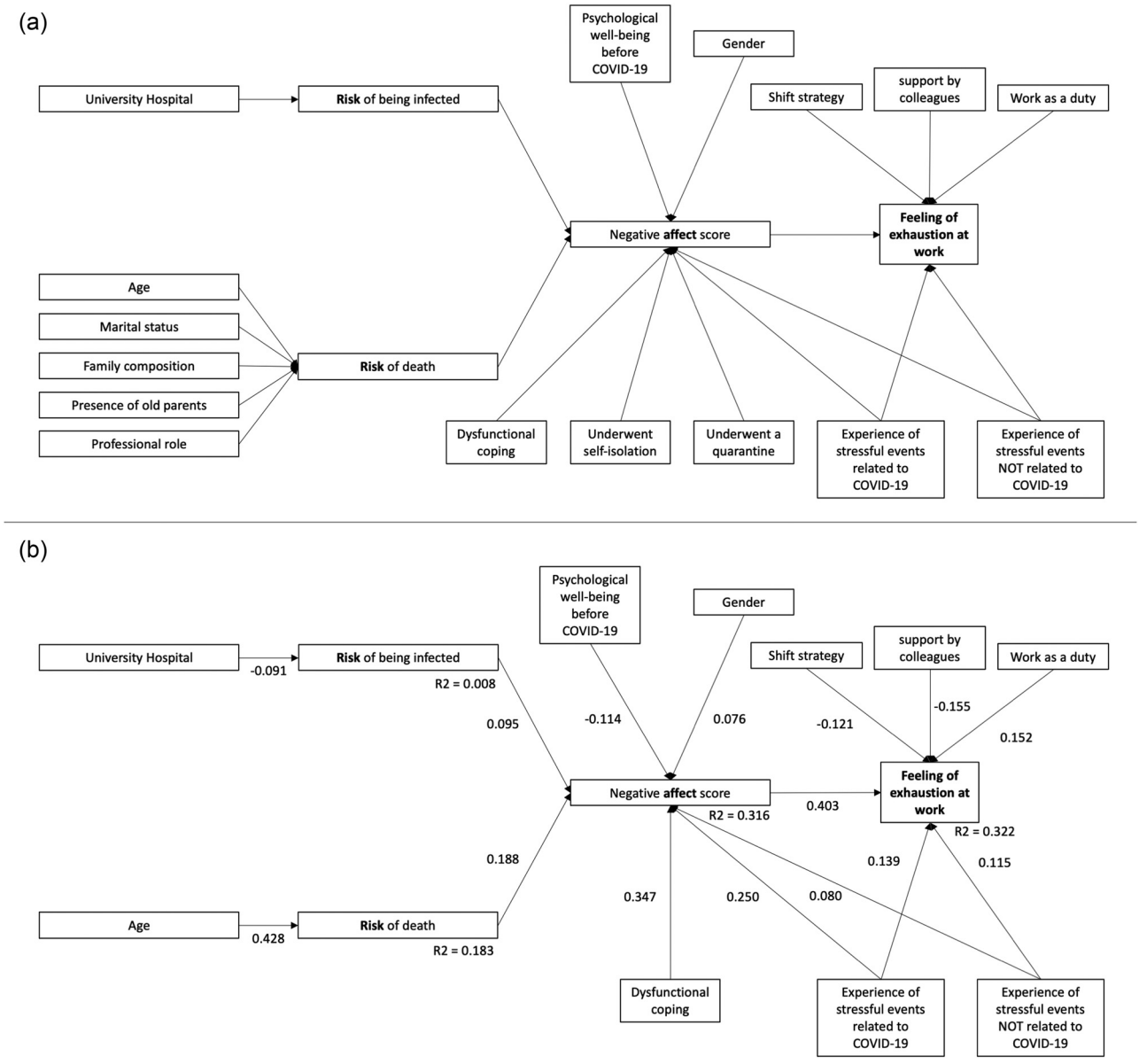

Figure 1: (a) Initial structural model based on the study hypothesis and the results of the multivariable generalized linear regression model predicting WE and observed univariate associations. (b) Final structural model and standardized path coefficients.

the pandemic, dysfunctional coping, and stressful events experiences. The adoption of a shift strategy, the perceived support by colleagues, and considering work as a duty were proposed to have a direct association with WE.

The proposed model was tested using structural equation modeling based on path analysis. The model exhibited optimal goodness of fit with an SRMR of 0.041 (Chi-square = 174.507, df = 49, $p < 0.001$; Comparative Fit Index [CFI] = 0.801; Tucker–Lewis Index [TLI] = 0.716; Akaike criterion (AIC) = 9828.240; primary outcome R^2 = 0.323; NAS R^2 = 0.323). In the model, the experience of a quarantine period or self-isolation was not statistically significantly associated with NAS. Moreover, marital status, family composition, living with old parents, and professional role were not associated with the perceived risk of death. The model tested by deleting these non-significant associations confirmed an optimal goodness of fit with an SRMR of 0.054 (Chi-square = 143.380, df = 31, $p < 0.001$; Comparative Fit Index [CFI] = 0.817; Tucker–Lewis Index [TLI] = 0.728; AIC = 9827.263; primary outcome R^2 = 0.322; NAS R^2 = 0.316). Regression coefficients are reported in Table S6. The final path diagram with standardized regression coefficients is shown in Figure 1b.

Cognitive factors of risk perception were positively associated with NAS, which mediates their association with the feeling of WE. Gender, psychological well-being

before the pandemic, and dysfunctional coping have an association with the feeling of exhaustion at work, mediated by NAS. Moreover, the experience of stressful events, both related and unrelated to COVID-19, has a direct and mediated association with WE. As proposed, perceiving work as a duty, perceived support by colleagues, and adoption of a shift strategy are confirmed to have a direct association with WE. Overall, the model explains 32.2% of the variance for the feeling of WE and 31.6% of the variance for the NAS.

3.7 Positive affect score

PAS was not included in the proposed theoretical model, being not associated with the outcome of interest and having an orthogonal relationship with NAS. Variables associated with PAS (Tables 1–3) were included in a multivariable generalized linear regression model (Table S5). Among factors having an independent association with PAS, only NAS, age, and the perception of work as a duty were included in the proposed theoretical model.

4 Discussion

In the present study, we investigated for the first time the association of cognitive (risk perception) and affective dimensions with WE among obstetrics HCPs during the COVID-19 pandemic, along with socio-demographic characteristics and COVID-19-related contextual factors. We built a model that explained 32.2% of the variance for WE and 31.6% of the variance for NAS. Our initial hypothesis that the association between risk perception and the feeling of WE was mediated by both negative affect and positive affect (emotional components) was partially confirmed. The final path analysis supported the hypothesis that the affective dimension mediates the association between the cognitive dimension (risk perception) and other personal and contextual factors with the feeling of WE, but only negative affect showed a significant mediating role.

Risk perception of being infected or being at risk of death when infected (cognitive dimensions) showed a positive association with the geographic area (center) and age. HCPs working at the University Hospital of Brescia reported a higher perceived risk of being infected compared to the other centers. This observation is consistent with the higher concentration of COVID-19 cases during the first wave of the pandemic in the Lombardia Region [53]. Concerning the perceived risk of death, only age was associated with this cognitive dimension in the final model. Previous research in the medical field showed that the youngest professionals had more concerns about infection than older ones [54,55]. Our different outcomes can be related to the observation that Italian media gave particular emphasis to the increased risk of death related to age during the most critical period of the pandemic, contributing to improving the perception of the risk of death in the case of infection in older compared to younger colleagues.

Concerning NAS, it was mainly associated with individual factors (i.e., psychological well-being before COVID, the current experience of stressful events related or unrelated to COVID, gender, and coping strategies). According to the vulnerability–stress model, psychological well-being and the absence of stressful events represent protective factors against mental health diseases [56]. Female HCPs showed greater proneness to feel anxiety, confirming previous research reporting that being female means a risk factor for psychological distress in the sanitary context [11,57]. Furthermore, NAS was related to the use of dysfunctional coping strategies, which in a previous paper [19] were also associated with clinically significant psychological distress measured by GHQ-12. This is consistent with previous literature showing an association between avoidant coping strategies and lower compassion satisfaction [58], higher distress [59], or more intense anxiety/depression symptoms [60] in medical settings. Dysfunctional coping strategies (Table S3) include a set of different mental and behavioral approaches such as self-blame and self-distraction strategies (i.e., watching TV, reading, sleeping). As already suggested by Del Piccolo et al. [19], some of them may have a psychological protective role as short-term strategies in a condition of emergency and uncertainty like a pandemic; however, they may be associated with NAS in the longer term, contributing to influencing the feeling of exhaustion at work.

In contrast with our initial hypothesis, PAS was not predicted by the risk perception nor associated with the feeling of WE. The exclusion of the PAS from our model is partly counterintuitive since the literature suggests that PAS is related to resilience [61]. Moreover, in our sample, the PAS was overall higher than NAS. In particular, adjectives “interested,” “attentive,” and “active” received a mean score of 40 out of 50. A speculative explanation can be that such feelings, although referring to positive emotional states, can also reflect a sense of cognitive activation or alarm condition. The fact that PAS does not persist in the final model suggests that workers who experience positive affect are not protected enough against the risk of WE in an extraordinary pandemic context.

WE had a mean value of nearly 12 in a 3–30 score range, suggesting, at first sight, that HCPs did not experience a high WE level. Nevertheless, half of the responders gave a median score of 6 or higher to the first item ("feeling of being exhausted by my job during this pandemic") and 5 or higher to the second ("weight of the professional role during this pandemic"). Conversely, the question "how much was considered to abandon the professional role during this pandemic" had a median score of 1. These data suggest that WE was high for the feeling of exhaustion and the perceived professional role weight, but very few HCPs thought to abandon work during the emergency. In our model, WE was primarily influenced by NAS, which mediated the association with multiple factors. Additionally, some associations resulted in direct interaction with some individuals (work perceived as a duty; experience of COVID-19-related stressful or unrelated stressful events), interpersonal (support received by colleagues), and organizational-contextual factors (adoption of shift strategy to ensure adequate rest and staff always available). Such results are consistent with previous research stressing the importance of peer-support approaches [62,63] and adequate health service management [64–67] to improve HCPs' wellbeing and prevent WE.

Besides assessment, observed associations in our final model suggest several practical implications once confirmed by prospective studies. Psychological wellbeing before COVID-19 represents a possible protective factor for the experience of negative affect during the pandemic and indirectly WE. This hypothesis, along with the direct and indirect association between the presence of stressors (related or unrelated to COVID-19) and feelings of exhaustion, suggests the importance to intervene in a preventive way in times of no emergency. This is especially true if we consider that COVID-19 can become a chronic health crisis and that future pandemics may become more frequent. Of note, psychological support for gynecologists and midwives has been previously suggested, independently of the current COVID-19 emergency, due to the high levels of post-traumatic stress disorder [9,10] and burnout [31] observed in these health workers. Such intervention, provided to the entire staff, may foster both individual and group resilience. Given the role of coping strategies, a focus on the most functional way to cope with stressors may reduce vulnerability to WE through a lower level of dysfunctional coping. On the other side, a group-based intervention can enhance cohesion and support inside the staff, which was associated with WE in our model. Implementing specific and individual interventions in high-demanding times may represent a way to enhance individual and group psychological wellness to maintain high-quality obstetric care.

In our sample, higher exhaustion at work was associated with a higher level of NAS but not with a lower level of PAS. Such data would be crucial in planning, monitoring, and intervening for HCPs involved in sanitary emergencies in the obstetric context. Monitoring and reducing the level of negative affect could be more prominent than raising the level of the positive one. If confirmed by further studies, our results suggest that traditional psychological models and tools aiming to increase positive affect need to be tuned to the specific situation, as suggested by Montero-Marin et al. [61], who underlie that HCPs' psychological needs can change depending on burnout progression stages. For example, in the first phase (which likely corresponds to the time of our survey and the first wave of the pandemic), negative arousal states and perceived overload are prevalent, whereas the need to rescue positive affect may occur later. This is crucial also in planning psychological interventions, which should therefore evaluate the timing of a sanitary crisis, considering different approaches according to the before-, during-, and after-crisis timeline. The changes in psychological needs during burnout progression stages may explain the differences between our observations and those reported by Zhang et al. [38], who observed a mediating role of both NAS and PAS in the association between resilience and burnout among frontline nurses in Wuhan during COVID-19 emergency.

Finally, interventions should take into account individual, interpersonal, and organizational-contextual factors, given the direct and indirect association of all of them with higher or lower WE, as emerged from the present study and elsewhere [19,64]. Such approaches should target cognition, but especially negative affect, as a mediator of WE.

4.1 Strengths and limitations

The present study has strengths and limitations related to the study design, as already discussed in previous work [19]. General strengths are the investigation of a quite large group of obstetrics HCPs including different professional roles in four university hospitals in Italy, the high response rate (84.4%), and that a multidisciplinary panel of experts in the field co-created the IPSICO survey. Specific strength is that we considered several factors at the individual, interpersonal, and organizational levels in building and testing the theoretical model with path

analysis. This allowed comprehending how such variables affect negative emotions and, finally, the feeling of WE. General limitations are the risk of recall (for some variables) and non-response biases and the cross-sectional nature of the study. Concerning this last point, the study design did not allow us to investigate how the relationship among the variables changes over time, supporting cause–effect associations. This implies that further studies are needed to confirm hypothesized protective or causative effects. Moreover, the study focused on the obstetric field, making results not generalizable to other HCPs. A specific study limitation is that the feeling of WE was measured with a non-validated composite outcome. Therefore, although the internal consistency was satisfactory, a different approach could generate different associations. Moreover, although we considered in the analyses potential differences among the four Centers, the generalizability of results may be affected by differences in the risk of infection and healthcare management across Italy.

5 Conclusions

Our study highlighted the importance of monitoring the affects experienced by HCPs working in the obstetric context during the current COVID-19 pandemic to understand the level of WE. Results showed that the negative component of the emotional dimension acts as a mediator in the association between the cognitive dimension and other factors and the feeling of WE, representing the main associated predictor. Conversely, the positive component did not play a role. Moreover, we observed that, whereas negative affect appears to be mainly influenced by factors at an individual level, WE is associated with personal, interpersonal, and organizational factors. From a practical perspective, our results suggest that in the first phase of a sanitary emergency, psychological approaches should consider monitoring negative affect rather than positive affect. Moreover, if our observation is confirmed by prospective studies confirming a cause–effect association, psychological interventions aiming to reduce negative affect before increasing positive one may be recommended, particularly in the first phase of a sanitary emergency. Moreover, psychological interventions at individual, social and contextual levels should all be considered to reduce the feeling of WE. Finally, further studies on the current pandemic will investigate whether our theoretical model changes over time, potentially supporting plastic monitoring of and intervention on the feeling of WE.

Abbreviations

Brief-COPE	brief coping orientation to problems experienced
CFI	comparative fit index
COVID-19	coronavirus disease 2019
HCPs	healthcare providers
IPSICO	impatto PSIcologico COVID-19 in ostetricia
NAS	negative affect score
PANAS	positive and negative affect schedule
PAS	positive affect score
SARS-COV2	severe acute respiratory syndrome coronavirus 2
SRMR	standardized root mean square residual
TLI	Tucker–Lewis index
WE	work exhaustion

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