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Research Article

Quality of life of critical care nurses and impact on anxiety, depression, stress, burnout and sleep quality: A cross-sectional study

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ABSTRACT

Objectives: To investigate how anxiety, depression, stress, burnout, and sleep quality impact on Quality of life of critical care nurses.
Background: Several studies reported that critical care nurses are exposed to a high risk of anxiety, depression, burnout, stress, and sleep quality, but we do not know the impact of critical care nurses.
Design: A cross-sectional study.
Methods: We have included all critical care nurses working in the intensive care unit for at least six months. Data were collected from December 1, 2021, to March 18, 2022. We evaluated the critical care nurses using the Depression Anxiety Stress Scale (DASS), Maslach Burnout Inventory scale, Pittsburgh Sleep Quality Index and Nurse Quality of Life. The primary endpoint is Quality of Life. Associations were tested using multivariate modelling.
Results: A total of 140 critical care nurses were included. Multivariate regression showed the relation between emotional QoL and emotional exhaustion and DASS total score [OR = 0.14; 95% CI (0.03–0.73); p = 0.019 and OR = 3.64; 95% CI (1.07–12.32); p = 0.038, respectively]. Personal accomplishment and DASS total score have a direct relationship on quality of work-life [OR = 0.21; 95% CI (0.05–0.82); p = 0.024 and OR = 4.18; 95% CI (1.01–17.33); p = 0.049, respectively].
Conclusions: The physical quality of life is not optimal in critical care nurses, while burnout and the DASS score directly impact the emotional and work-life quality of life.
Implications for clinical practice: Our research has highlighted the importance of detecting the quality of life of critical care nurses. The nurses should take proper care of their health by adopting the right health behaviours to create correct work conditions and increase the quality of care for critically ill patients.

Background

Quality of Life (QoL) in nurses is a multidimensional concept that can be influenced by various factors (Khatatbeh et al., 2021; Taghavi et al., 2014; Wu et al., 2011). Several authors describe that nurses often face significant problems such as occupational stressors, job burnout, physical strain, psychological strain, long working hours, and heavy workloads, staff shortages that can affect their QoL (Gravante et al., 2023; Lee and Yusof, 2018; Orszulak et al., 2022; Wu et al., 2011).

It is described in the literature that the QoL of nurses is significantly

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lower than that of the general population (Wu et al., 2011). In addition, 33% of nurses report a problem with all QoL dimensions: physical, emotional, social, and occupational (Muthuri et al., 2020; Gravante et al.,2023). Lin and colleagues (2015) describe how nurses' QoL is a crucial aspect of organizations and is directly associated with job performance (Lin et al., 2015). Improving nurses' job performance is necessary to increase the quality of care and ensure better patient safety (Farnese et al., 2019).

Work environments can influence nurses' well-being. Interactions with technology and the intensive care unit (ICU) physical environment characterize intensive nursing care in the ICU. It is known that critical care nurses (CCNs) are exposed to experiences with high-stress content more than other nurses because of their complex clinical environment (Melnyk et al., 2021). Some studies described the ICU wards as stressful work environments for CCNs due to the increased use of advanced technology and frequent exposure to loud alarms and fluorescent light sources (Donchin and Seagull, 2002; Khatatbeh et al., 2021). CCNs have high rates of post-traumatic stress disorder (PTSD), burnout, anxiety and depression (Chuang et al., 2016; Karanikola et al., 2015; Mealer et al., 2007, 2009). Approximately 24% of CCNs suffer from PTSD compared with other nurses (Mealer et al., 2007). It is also documented that 47% of CCNs report burnout-related symptoms (Chuang et al., 2016). The prevalence of symptoms such as anxiety and depression is 15% and 30%, respectively (Janda and Jandová, 2015; Mealer et al., 2007). Another problem CCNs face is poor sleep quality (Dong et al., 2020). Sleep deprivation has negatively impacted nurses' QoL (Dong et al., 2020). Several authors describe the prevalence of sleep disturbance (Dong et al., 2020; Zhang et al., 2016). Dong and colleagues (2020) reported that 71% of CCNs suffer from sleep disturbances.

Although many studies describe the QoL of nurses in different settings, a few studies were performed in the ICU setting (Gravante et al., 2023; Lee and Yusof, 2018; Orszulak et al., 2022; Wu et al., 2011). In the United Arab Emirates, a recent ICU study showed that 76.8% of CCNs reported low QoL (Ahmed et al., 2023). Furthermore, poor QoL is associated with job stress and caring behaviour (Babapour et al., 2022). In Italy, few studies have been conducted on the QoL of CCNs (Turchi et al., 2019).

Recently, nursing literature started to investigate occupational health conditions and organizational well-being in nurses due to the specificity challenges to which they are subjected daily, such as being in contact with people who suffer (Brand et al., 2017; Della Bella et al., 2022; Vu-Eickmann et al., 2018). The well-being of nurses translates into an increase in the quality of care for all patients (Irurita, 1999). To increase the quality of care and patient safety, nursing managers should measure each adverse outcome's impact on QoL (Sili et al., 2022).

No evidence in the literature indicates how each adverse outcome affects the QoL of CCNs. We hypothesize that many adverse outcomes negatively influence the dimensions of the QoL of CCNs.

Aim

This study investigated how anxiety, depression, stress, burnout, and sleep quality impact on QoL of CCNs.

We tested the following hypothesis:

Higher anxiety, depression, stress, burnout and poor sleep quality are associated with a negative impact on the physical, emotional, social and work-life QoL of CCNs.

Methods

Design and ethics

We conducted an observational, cross-sectional multi-centre study in three public hospitals: (1) A. Cardarelli Hospital in Naples, (2) Federico II university Hospital in Naples, and (3) G. Pascale Research Institute in Naples. The research was approved by the Ethics Committee of "Cardarelli-Santobono" (n.10/21 del 30.06.2021). The researchers contacted and informed the participants about the project personally, and written informed consent was obtained. Confidentiality of the personal information was guaranteed, following the research recommendations of the Declaration of Helsinki. The research report is in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (von Elm et al., 2008).

Setting and participant

Researchers collected data from December 1, 2021, to March 18, 2022, in six different ICUs: two general ICUs with 20 and 8 beds, respectively, a medical ICU and a coronary ICU composed of 8 beds each, two surgical ICUs with admissions for general surgery and cardiac surgery with 6 beds each. We recruited a total of 204 registered nurses for the study. Inclusion criteria were: (1) nurses of both sexes; (2) nurses working in the ICU for at least six months and accepting to participate in the research. We excluded each nurse if they declared a history of mental health disease or a high-stress level at the moment of an invitation to participate in the study.

To estimate the sample size of the CCNs necessary for the statistical analysis, we assumed a low quality of life prevalence of 15% (Gravante et al., 2023) and a standard error of 6%; the minimum sample size required is 136 nurses. We calculated the sample size based on the world health organization's recommendations for sample size determination in health studies (Lwanga and Lemeshow, 1991).

Study endpoint and variables

The primary endpoint was the QoL of the CCNs assessed by four domains: physical, emotional, social and work-life. Target predictors included anxiety, depression, stress and burnout on sleep quality. Researchers also collected covariates such as socio-demographic information such as sex, age, family status, number of sons, smoking, alcohol use, physical activity, education, years worked as a nurse, years worked in ICU, nurses worked with Covid-19 patients, and type of ICU (Respiratory ICU, Surgical ICU, Medical ICU, Coronary ICU, Cardiac surgery ICU, General ICU).

Data collection and instruments

After contacting the head nurses in each ICU, a researcher referent for the hospital informed nurses about the study's aims and exclusion criteria and invited them to participate and sign the informed consent. Afterwards, the researcher handled the questionnaire to nurses individually. All nurses were eligible for analysis completed and returned the questionnaire. The questionnaire comprised two sections: (1) Socio-demographic information, (2) Nurse Quality of Life (NQoLS), Maslach Burnout Inventory (MBI) scale, Depression Anxiety Stress Scales (DASS-21), and Pittsburgh Sleep Quality Index (PSQI).

NQoLS is a tool validated initially in the Italian language (Sili et al., 2018) that measures the QoL for nurses in four areas: Quality of Physical Life (QoPL), Quality of Emotional Life (QoEL), Quality of Social Life (QoSL), and Quality of work-life (QoWL). Subsequently, the psychometric properties were tested (Sili et al., 2022). NQoLS is a tool that measures Qol in a specific population, such as nurses (Sili et al., 2018). NQoLS is composed of 28 items (QoPL = 8 Items; QoEL = 8 Items; QoSL = 6 Items; QoWL = 6 Items). Each item allows four short response options from 1 (dissatisfied) to 4 (very satisfied), and total scores range from 28 to 112 (Sili et al., 2018). The NQoLS score is calculated using each dimension's mean and standard deviation. QoL scores ≤ 2.50 were considered low, whereas scores higher than 2.50 were considered satisfactory. In the literature, NQoLS showed good reliability (Cronbach's alpha ranged from 0.81 to 0.89 for all areas) and validity using confirmatory factor analysis (Sili et al., 2018, 2022).

Burnout was measured using the Italian version of the MBI by

Maslach et al. (1997) and (Sirigatti and Stefanile, 1993). This version of the MBI scale classifies burnout into three dimensions: emotional exhaustion (EE), depersonalization (DE), and personal accomplishment (PA), where EE refers to feeling emotionally overwhelmed and exhausted, DE perceiving others as objects, not as sensitive persons, and PA perceiving comfort through valuable tasks. The MBI consists of 22 items assessed on a seven-point Likert scale from 0 ("never") to 6 ("every day"), divided as follows: (1) EE (9 items), (2) DP (5 items), and (3) PA (8 items). Total scores range from 0 to 132. The score for each subscale can be represented as (1) low, (2) medium and (3) high. Total scores range from 0 to 122 divided as follows [EE range from 0 to 54; DP range from 0 to 30; PA range from 0 to 48]. We considered the MBI ranges for all dimensions as follows: (1) EE (High $\geq$ 24; Medium = 15–23; Low = 0–14), (2) DP (High $\geq$ 9; Medium = 4–8; Low = 0–3) and PA (High = 0–29; Medium = 30–36, Low $\geq$ 37) (Maslach et al., 1997). The psychometric properties of the MBI health profession were tested, showing good reliability for EE (Cronbach's alpha values 0.87), questionable DP (Cronbach's alpha values 0.68) and acceptable (Cronbach's alpha values 0.76). In contrast, validity was tested using confirmatory factor analysis (Sirigatti and Stefanile 1993).

Anxiety, depression, and stress were measured using the DASS-21 scale in the Italian version (Bottesi et al., 2015). The instrument consists of three dimensions (anxiety, depression, and stress) and 21 items, 7 for each dimension. Each item has a four-point Likert scale answer option ranging from 0 ("It never happened") to 3 ("It happened almost always"). DASS 21 has six score levels: normal, mild, moderate, severe, extremely severe, and DASS-21 total score (Lovibond and Lovibond, 2011). Scoring was considered as follows: anxiety (normal = 0–3, mild = 4–5, moderate = 6–7, severe = 8–9, extremely severe $\geq$ 10); depression (normal = 0–4, mild = 5–6, moderate = 7–10, severe = 11–13, extremely Severe $\geq$ 14); stress (normal = 0–7, mild = 8–9, moderate = 10–12, severe = 13–16, extremely severe $\geq$ 17) (Lovibond and Lovibond, 2011). The internal consistency of DASS-21 showed that it has excellent Cronbach's alpha values of 0.85, 0.82, and 0.90 for the subscales of stress, depression, and DASS-21 total score, respectively. In contrast, the internal consistency of DASS - anxiety shows a Cronbach's alpha value of 0.74.

We used the Italian version of the PSQI tool (Curcio et al., 2013) to measure sleep disorders. The tool consists of 19 self-rated questions in seven components: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The answer option ranged from 0 to 21, and we consider a significant sleep disturbance PSQI score >5. We obtained the overall score by adding seven component scores. Psychometric properties of the PSQI tool consist of a high internal consistency (Cronbach's alpha value of 0.83), and the result of the ROC curve showed a high sensitivity (0.939) and specificity (0.471).

Data analysis

Categorical variables were summarized through frequencies and percentage values, while continuous variables were through mean and relative standard deviation, when appropriate. We evaluated associations between groups using Fisher exact or chi-square tests. Furthermore, we used multiple logistic regression analyses to examine the relationship to dimensions (physical, emotional, social, and work) of quality of life and burnout, anxiety, depression, and quality of sleep with 95% confidence intervals (95% CI) and p-value <0.05. We consider the dichotomous DASS-21 values for anxiety, depression, stress and DASS-21 total score as follows: normal (score normal) Vs no normal (mild, moderate, severe, extremely severe). We conducted statistical analyses using SPSS software (SPSS version 21, SPSS Inc., Chicago, IL, USA).

Results

We recruited a total of 204 nurses. Following inclusion criteria, 140 CCNs were eligible for data analysis (Fig. 1). All CCNs have completed the full questionnaires. Most of the nurses were male [N = 75; (53.6%)] with a mean age of 41.8 (SD ± 11.0). On average, the working years as a nurse were 16.5 (SD ± 10.5), while the work experience as CCN was 11.7 (SD ± 10.2) years. As reported in Table 1, CCNs reported a low quality of physical life [low; N = 75, (53.6%) vs high; N = 65, (46.4%)].

Association between QoL and anxiety, depression, stress and burnout on sleep quality

Associations between burnout, anxiety, depression, stress, sleep quality, and QoL's four dimensions are reported in Table 2. Nurses with a high level of emotional exhaustion [low; N = 35 (71.4%); vs high; N = 14 (28.6%); p = 0.002] and low quality of sleep [low; N = 62 (61.4%) vs high; N = 39 (38.6%); p = 0.003] report a low quality of physical life. No statistically significant differences were observed between the quality of physical life and depersonalization (p = 0.1), personal accomplishment (p = 0.1), anxiety (p = 0.5), depression (p = 0.052), and stress (p = 0.1).

High nurses' quality of emotional life was directly associated with decreased levels of emotional exhaustion [low; N = 2 (3.4%) vs high; N = 56 (96.6%); p < 0.001], depersonalization [low; N = 2 (3.6%) vs satisfactory; N = 53 (96.4%); p < 0.001], anxiety [low; N = 10 (8.5%)vs satisfactory; N = 108 (91.5%); p < 0.001], depression [low; N = 12 (9.6%) vs high; N = 113 (90.4%); p < 0.001], and stress [low; N = 12 (9.9%) vs high; N = 109 (90.1%); p < 0.001] (Table 2). CCNs with a low level of depersonalization report a high level of social life [low; N = 9 (16.4%) vs high; N = 46 (83.6%); p = 0.006].

Also, results showed that CCNs with low levels of emotional exhaustion [low; N = 4 (6.9%) vs high; N = 54 (93.1%); p < 0.001], depersonalization [low; N = 4 (7.3%) vs high; N = 51 (92.7%); p < 0.001], personal accomplishment [low; N = 4 (8.7%) vs high; N = 42 (91.3%); p < 0.001] report high levels of quality of work life, while a high level of anxiety [low; N = 13 (59.1%) vs high; N = 9 (40.9%); p < 0.001], depression [low; N = 12 (80.0%) vs high; N = 3 (20.0%); p < 0.001] and stress [low; N = 11 (57.9%) vs high; N = 8 (42.1%); p < 0.001] negatively affect the quality of work life as shown in Table 2.

Multivariate logistic regression

We conducted a multivariate model, and the only factor associated with quality of physical life was emotional exhaustion [high vs low; OR = 0.29; 95% CI (0.12–0.66); p = 0.003]. Multivariate regression showed emotional exhaustion, and DASS total score was associated with the emotional quality of life [OR = 0.14; 95% CI (0.03–0.73); p = 0.019 and OR = 3.64; 95% CI (1.07–12.32); p = 0.038, respectively]. Our results show that two dimensions of burnout influenced the quality of social life, high levels of emotional exhaustion and depersonalization, in

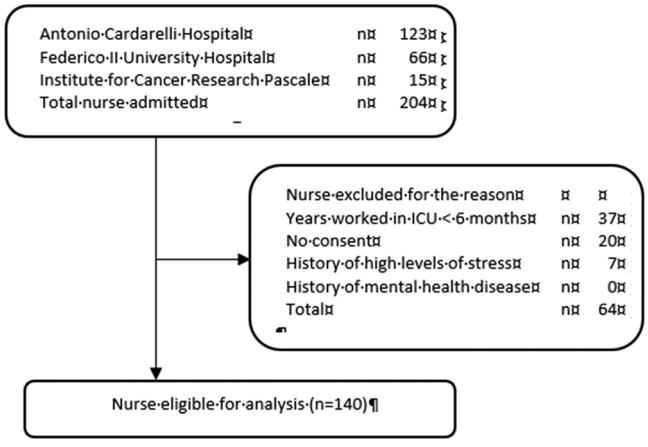

Fig. 1. Flowchart nurses included.

Table 1
Socio-demographic factors and Quality of life (N = 140).

Factors	N	(%)
Sex		
Male	75	(53.6)
Female	65	(46.4)
Age (years)		
21-29	25	(17.9)
30-39	40	(28.6)
40-49	34	(24.3)
>50	41	(29.3)
Nurse education		
Diploma in Nursing	28	(20.0)
Bachelor	85	(60.7)
Master in Nursing Science	8	(5.7)
Other Degree	19	(13.6)
Family status		
Married	80	(57.1)
Widower	1	(0.7)
Divorced	3	(2.1)
Separate	5	(3.6)
Celibate	19	(13.6)
Maiden	32	(22.9)
Sons		
Yes	86	(61.4)
No	54	(38.6)
Smoking		
Yes	45	(32.1)
No	95	(67.9)
Alcohol use		
Yes	18	(12.9)
No	122	(87.1)
Physical activity		
Yes	66	(47.1)
No	74	(52.9)
Years worked as a nurse		
<5	22	(15.7)
5–9	22	(15.7)
10–19	43	(30.7)
20–29	30	(21.4)
>30	23	(16.4)
*Years worked in ICU**		
<5	49	(35.0)
5–9	22	(15.7)
10–19	40	(28.6)
20–29	14	(10.0)
>30	15	(10.7)
Covid-19 Patient Care		
Yes	63	(45.0)
No	77	(55.0)
Type of ICU		
Respiratory ICU	31	(22.1)
Surgical ICU	22	(15.7)
Medical ICU	47	(33.6)
Coronary ICU	19	(13.6)
Cardiac surgery ICU	13	(9.3)
General ICU	8	(5.7)
Shift		
Only daytime	121	(86.4)
Day and night	19	(13.6)
QoL dimensions**		
Quality of Physical Life		
Low	75	(53.6)
High	65	(46.4)
Quality of Emotional Life		
Low	21	(15.0)
High	119	(85.0)
Quality of Social life		
Low	30	(21.4)
High	110	(78.6)
Quality of work life		
Low	31	(22.1)
High	109	(77.9)

*ICU = Intensive Care Unit.
**QoL= Quality of Life.

comparison with low levels, have a lower probability of a good quality of social life [OR = 0.31; 95% CI (0.12–0.84); p = 0.022 and OR = 0.31 95% CI (0.12–0.79); p = 0.015, respectively].

CCNs with a high level of emotional exhaustion, depersonalization, and personal accomplishment, compared to those with low levels, appear to have a very low probability of having a good quality of work-life [OR = 0.10 95% CI (0.03–0.32); p < 0.001 and OR = 0.09 95% CI (0.03–0.31); p < 0.001 and OR = 0.17 95% CI (0.05–0.53); p < 0.001, respectively]. For CCNs with normal levels of the DASS domains, we found a high probability of having a high quality of work-life (Table 3). Multivariate regression shows a relationship between (1) personal accomplishment and (2) DASS total predictors versus quality of work-life [OR = 0.21 95% CI (0.05–0.82); p = 0.024 and OR = 4.18 95% CI (1.01–17.33); p = 0.049, respectively].

Discussion

This study investigated the relationship between adverse outcomes such as anxiety, depression, burnout, and sleep quality to critical nurse QoL dimensions. Our main findings described that CCNs report a low QoPL and an association between adverse effects and critical nurse QoL. Multivariate regression showed a relationship between emotional exhaustion and physical and emotional life quality. A low DASS total score was associated with a higher probability of having a good emotional and work-life QoL.

Quality life

A recent systematic review describes that burnout negatively affects the QoL. ICUs are stressful work environments for nurses; ventilator sounds and cardiac monitoring can expose CCNs to high levels of burnout (Khatatbeh et al., 2021). Our study revealed that high emotional exhaustion and depersonalization levels could influence QoPL. Nurses report that in a stressful workplace, harmful eating habits affect QoPL (Lanuza et al., 2022; Phiri et al., 2014). So, careful attention should be addressed to stress and burnout levels among ICU nurses to prevent adverse effects on QoPL.

Sleep is an essential function that guarantees physical well-being in humans (Ferrara and De Gennaro, 2001). Sleep deprivation was associated with less productive behaviours (Müller and Guimarães, 2007).In our sample, sleep quality negatively influenced QoPL, similar to the results of Palhares and colleagues (Palhares et al., 2014). Therefore, to guarantee physical QoL for intensive care nurses and better performance at work, managers should take care when scheduling shifts for nurses to allow for physical recovery.

Multivariate regression showed that the low DASS total scores are associated with good QoL. Stress, anxiety and depression can result from persistent workloads. CCNs are exposed to a high workload in the ICU (Lucchini et al., 2015) and a high care complexity of ICU patients (Lucchini et al., 2015). It has been described in the literature how the workload can affect nurses in the physical, mental and emotional dimensions (Ivziku et al., 2022). Previous research also shows that many adverse events that may occur in ICU patients are correlated with a high nursing workload (Almenyan et al., 2021; Lucchini et al., 2013, 2015). Therefore, nurse managers should identify and control stressful events and workloads in ICU to improve QoL.

The study findings reported the description of predictors influencing critical nurse quality-of-life dimensions. Several organizational models have been applied to improve the occupational well-being of nurses by positively impacting patient outcomes (Della Bella et al., 2022). Organizational well-being is a crucial consideration for executives focused on improving the quality of care and patient outcomes. Intensive care units guarantee intensive care by exposing nurses to various problems. A well-being, health-promoting lifestyle and work environment satisfaction (WHS) based model shows positive results among nurses (Chung et al., 2020; Della Bella et al., 2022). This model comprises all health

Table 2
Relation between Anxiety, Depression, Stress, Burnout, Sleep Quality on Quality of Life (n = 140).

Dimensions of Quality of Life												
		Quality of Physical Life			Quality of Emotional Life			Quality of Social life			Quality of work life		
Adverse outcome	Domains	Low	High		Low	High		Low	High		Low	High	
		n (%)	n (%)	p-value	n (%)	n (%)	p-value	n (%)	n (%)	p-value	n (%)	n (%)	p-value
Burnout	*Emotional exhaustion (level)*			0.002			< 0.001			0.051			< 0.001
	Low	22 (37.9)	36 (62.1)		2 (3.4)	56 (96.6)		7 (12.1)	51 (87.9)		4 (6.9)	54 (93.1)	
	Medium	18 (54.5)	15 (45.5)		4 (12.1)	29 (87.9)		9 (27.3)	24 (72.7)		5 (15.2)	28 (84.8)	
	High	35 (71.4)	14 (28.6)		15 (30.6)	34 (69.4)		15 (30.6)	34 (69.4)		21 (42.9)	28 (57.1)	
	Depersonalization			0.130			< 0.001			0.006			< 0.001
	Low	24 (43.6)	31 (56.4)		2 (3.6)	53 (96.4)		9 (16.4)	46 (83.6)		4 (7.3)	51 (92.7)	
	Medium	23 (56.1)	18 (43.9)		5 (12.2)	36 (87.8)		5 (12.2)	36 (87.8)		6 (14.6)	35 (85.4)	
	High	28 (63.6)	16 (36.4)		14 (31.8)	30 (68.2)		17 (38.6)	27 (61.4)		20 (45.5)	24 (54.5)	
	Personal accomplishment			0.124			0.126			0.185			< 0.001
	Low	19 (41.3)	27 (58.7)		3 (6.5)	43 (93.5)		6 (13)	40 (87)		4 (8.7)	42 (91.3)	
	Medium	21 (58.3)	15 (41.7)		6 (16.7)	30 (83.3)		9 (25)	27 (75)		5 (13.9)	31 (86.1)	
	High	35 (60.3)	23 (39.7)		12 (20.7)	46 (79.3)		16 (27.6)	42 (72.4)		21 (36.2)	37 (63.8)	
Quality of sleep	*PSQI*			0.003			0.188			0.116			0.116
	Low	62 (61.4)	39 (38.6)		18 (17.8)	83 (82.2)		26 (25.7)	75 (74.3)		26 (25.7)	75 (74.3)	
	High	13 (33.3)	26 (66.7)		3 (7.7)	36 (92.3)		34 (87.2)	5 (12.8)		5 (12.8)	34 (87.2)	
DASS	*DASS total score*			0.367			<0.001			0.287			<0.001
	Normal	63 (52.1)	58 (47.9)		12 (9.9)	109 (90.1)		25 (20.7)	96 (79.3)		17 (14.0)	104 (86.0)	
	No normal	12 (63.2)	7 (36.8)		9 (47.4)	10 (52.6)		6 (31.6)	13 (68.4)		13 (68.4)	6 (31.6)	
Depression	*DASS-Depression*			0.052			<0.001			0.323			< 0.001
	Normal	63 (50.4)	62 (49.6)		12 (9.6)	113 (90.4)		26 (20.8)	99 (79.2)		18 (14.4)	107 (85.6)	
	No normal	12 (80)	3 (20)		9 (60)	6 (40)		5 (33)	10 (67)		12 (80.0)	3 (20.0)	
Anxiety	*DASS-Anxiety*			0.572			<0.001			0.234			< 0.001
	Normal	62 (52.5)	56 (47.5)		10 (8.5)	108 (91.5)		24 (20.3)	94 (79.7)		17 (14.4)	101 (85.6)	
	No normal	13 (59.1)	9 (40.9)		11 (50)	11 (50)		7 (31.8)	15 (68.2)		13 (59.1)	9 (40.9)	
Stress	*DASS-Stress*			0.163			<0.001			0.097			< 0.001
	Normal	62 (51.2)	59 (48.8)		12 (9.9)	109 (90.1)		24 (19.8)	97 (80.2)		19 (15.7)	102 (84.3)	
	No normal	13 (68.4)	6 (31.6)		9 (47.4)	10 (52.6)		7 (36.8)	12 (63.2)		11 (57.9)	8 (42.1)	

PSQI = Pittsburgh Sleep Quality Index; DASS total score=Depression Anxiety and Stress Scale – total score.

professionals' behaviours to maintain or increase their well-being, personal happiness and satisfaction (Chung et al., 2020). Precisely, it measures well-being on two constructs of contentment and joy, a healthy lifestyle on physical activity, positive values and desire to share and meet job satisfaction on benefits, respect, rewards, and support and guarantees all crucial aspects components of nurses QoL (Chung et al., 2020; Orszulak et al., 2022). In 2022, Orszulak and colleagues showed how higher quality of life improves the level of health behaviour of nursing staff (Orszulak et al., 2022).

Nursing managers can promote the QoL by improving the

Table 3
Univariate/Multivariate regression of nurses' quality of life (n = 140).

Dimensions of Quality of Life															
Adverse outcome	Domains	Quality of Physical Life		Quality of Emotional Life				Quality of Social Life				Quality of Work Life			
		Univariate		Multivariate		Univariate		Multivariate		Univariate		Univariate		Multivariate	
		OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value
Burnout	*Emotional exhaustion*														
	Low	1.00		1.00		1.00		1.00		1.00		1.00		1.00	
	Medium	0.51 (0.21-1.21)	0.127	0.55 (0.23-1.33)	0.183	0.26 (0.05-1.50)	0.131	0.28 (0.05-1.60)	0.151	0.37 (0.12-1.10)	0.073	0,42 (0.10-1.67)	0.215	0.49 (0.10-2.24)	0.355
	High	0.24 (0.11-0.55)	0.001	0.29 (0.12-0.66)	0.003	0.08 (0.02-0.38)	0.001	0.14 (0.03-0.73)	0.019	0.31 (0.12-0.84)	0.022	0.10 (0.03-0.32)	<0.001	0.27 (0.06-1.17)	0.079
	Depersonalization														
	Low	1.00				1.00				1.00		1.00		1.00	
	Medium	0.61 (0.27-1.37)	0.228			0.27 (0.05-1.48)	0.132			1.41 (0.43-4.57)	0.568	0.46 (0.12-1.74)	0.251	0.89 (0.20-4.00)	0.883
	High	0.44 (0.20-0.99)	0.049			0.08 (0.02-0.38)	0.001			0.31 (0.12-0.79)	0.015	0.09 (0.03-0.31)	<0.001	0.37 (0.09-1.55)	0.173
	Personal accomplishment														
	Low	1.00				1.00				1.00		1.00		1.00	
	Medium	0.50 (0.21-1.22)	0.128			0.35 (0.08-1.51)	0.158			0.45 (0.14-1.41)	0.171	0.59 (0.15-2.38)	0.459	0.76 (0.15-3.97)	0.747
	High	0.46 (0.21-1.02)	0.055			0.27 (0.07-1.01)	0.052			0.39 (0.14-1.11)	0.077	0.17 (0.05-0.53)	0.002	0.21 (0.05-0.82)	0.024
Quality of sleep	*PSQI*														
	Low	1.00				1.00				1.00		1.00			
	High	3.18 (1.46-6.92)	0.004			2.60 (0.72-9.39)	0.144			2.36 (0.83-6.67)	0.106	1.71 (0.64-4.58)	0.283		
DASS	*DASS total score*														
	No normal	1.00				1.00		1.00		1.00		1.00		1.00	
	Normal	1.58 (0.58-4.28)	0.370			8.18 (2.78-24.07)	<0.001	3.64 (1.07-12.32)	0.038	1.77 (0.61-5.13)	0.291	13.26 (4.44-39.61)	<0.001	4.18 (1.01-17.33)	0.049
Depression	*DASS-Depression*														
	No normal	1.00				1.00				1.00		1.00			
	Normal	3.94 (1.06-14.6)	0.041			14.13 (4.29-46.53)	<0.001			1.90 (0.60-6.06)	0.275	23.78 (6.10-92.65)	<0.001		
Anxiety	*DASS-Anxiety*														
	No normal	1.00				1.00				1.00		1.00			
	Normal	1.31 (0.52-3.29)	0.572			10.80 (3.75-31.09)	<0.001			1.83 (0.67-4.98)	0.239	8.58 (3.18-23.17)	<0.001		
Stress	*DASS-Stress*														
	No normal	1.00				1.00				1.00		1.00			
	Normal	2.06 (0.74-5.78)	0.169			8.18 (2.78-24.07)	<0.001			2.36 (0.84-6.63)	0.104	7.38 (2.63-20.76)	<0.001		

Univariate and Multivariate analysis (y=High Quality of Life Vs Low Quality of Life; $p<0.05$).
PSQI = Pittsburgh Sleep Quality Index; DASS total score=Depression Anxiety and Stress Scale – total score.

psychological flexibility of CCNs by assigning tasks according to seniority and ability (Wang et al., 2020). An organizational intervention is based on applying the incentive models, health factors and healthy lifestyle, increasing nurses' autonomy and enthusiasm and improving psychological flexibility (Chung et al., 2020; Yuan and Zhang, 2015). In 2015, Yuan & Zhang showed that motivation-related factors that make people work hard are incentive and health factors (Yuan and Zhang, 2015). The literature describes how nursing managers should propose ICU nurses' psychological resilience interventions with routine psychological counselling meetings to increase QoL. At the same time, outdoor group activities should be encouraged, which could foster a positive working atmosphere, creating a moment of relief from emotional and work pressures for the CCNs (Hu et al., 2020).

Furthermore, enhancing QoL, physical health and the working environment should be critical in managing human resources that deliver quality care. To maintain and sustain a healthy workforce, nursing managers have several tools to increase nurses' QoL, such as schemes and activities, such as flexible working hours and job redesigning (Kowitlawkul et al., 2019).

Implication of clinical practice and future research

Our results can serve as an instrument for hospital nursing managers to identify at-risk individuals early to guarantee the delivery of quality care and improve patient outcomes. Monitoring the QoL of nurses should be a key focus for managers or decision-makers to improve care outcomes. Future research should focus on intervention studies to improve the QoL of CCNs at increased risk of QoL deterioration.

Strengths and limitations

This study has some main strengths: it describes an aspect little investigated in the organizational field by health-promoting organizations and contributes to management literature in identifying predictors that may affect the nurse's QoL, a much-discussed factor in models on the corporate well-being of nurses. Although the sample of this study was small, it allowed us to describe how adverse outcomes can affect the QoL of CCNs; the minimum size was calculated and exceeded. A multicenter Italian study using a tool in a specific population to identify the QoL's peculiarities is desirable.

Some limitations are present as well. The location of the included centres represents a limitation. All the ICU centres included pertain to a single Italian region; we cannot, therefore, determine the impact of the adverse outcomes on the QoL of the CCNs in Italy. Additionally, the cross-sectional design does not allow for the generalization of the results and direct causality.

Conclusions

In conclusion, the study highlights that the Italian CCNs suffer from a physical quality of life deterioration. CCNs with a low DASS total score are likelier to have a good quality of life in the emotional and work-life dimensions. Furthermore, for a complete understanding of the phenomenon, the organizational variables' impact on the QoL of CCNs and the quality of care could be the subject of future research.

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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.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.iccn.2023.103494.

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