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Work burnout and coping strategies among Egyptian forensic physicians: a national study

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Abstract

Background: Forensic physicians are confronted daily with highly stressful and traumatic duties. With repeated exposure, they are at risk of psychological distress, especially burnout. The current study's objective was to measure the prevalence of burnout and its associated factors among Egyptian forensic physicians, describe their coping strategies, and the correlation between burnout levels and coping strategies. A cross-sectional study on Egyptian forensic physicians was carried out using a self-administered questionnaire. It included personal and occupational data, Maslach Burnout Inventory, and the Brief COPE Inventory. Multivariable logistic regression was performed to identify significant independent predictors of burnout. The correlation between burnout and coping was examined.

Results: Moderate/high levels of burnout were scored by 72.9 %, 51.9%, and 75.9% of forensic physicians in the emotional exhaustion, depersonalization, and personal accomplishment subscales, respectively. The significant independent predictors of high emotional exhaustion were being a forensic examiner (AOR, 3.1; 95% CI, 1.3–7.6) and facing stressful job duties more than five times per month (AOR, 4.4; 95% CI, 1.6–12.3). The predictor of high depersonalization was being a forensic examiner (AOR, 22.8; 95% CI, 8.0–64.8), and for low personal accomplishment was being a female (AOR, 3.0; 95% CI, 1.3–6.8). The most frequent coping strategies adopted by forensic physicians were adaptive coping.

Conclusions: Egyptian forensic physicians have a high prevalence of burnout. Forensic examiners, females with high exposure to stressful duties are more likely to have high burnout levels. Thus, psychoeducation and psychological support services should be applied and made easily accessible to them.

Keywords: Brief COPE inventory, Burnout, Coping, Forensic physicians, Maslach Burnout Inventory, Occupational stress

Background

In various occupations, work burnout is a prevalent phenomenon where prolonged exposure to chronic work stresses results in a psychological strain (Shin et al. 2014). Maslach et al. (1996) established a burnout definition as "a psychological syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment".

Work burnout has serious adverse individual health consequences, both physical (cardiovascular diseases, diabetes, severe injuries, and death) and psychological (anxiety, insomnia, and depression). It also has adverse organizational and occupational outcomes (diminished job performance and quality of service, job dissatisfaction, presenteeism, absenteeism, and high turnover) (Salvagioni et al. 2017; Ochoa 2018).

Factors underlying the development of work burnout are both job-related and individual factors. These factors usually result in chronic job stress that ends with burnout (Bakker and Costa 2014). The Job Demands-Resources (JD-R) model explains that employees' wellbeing is

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dependent on the balance between both job demands and job resources and that high demands/poor resources is associated with physiological and/or psychological costs (exhaustion) (Bakker et al. 2014).

Thus, occupations with repeated exposure to stressful and distressing events and situations have high burnout rates. Forensic physicians/medical examiners/coroners, among other first responders and law enforcement personnel, are often confronted with several traumatic incidents, and their job duties can be categorized as highly stressful. Performing autopsies, dealing with mutilated or decomposed bodies, and the concept of death is always distressing. Also, the examination of victims, especially children and victims of sexual assaults, can cause severe emotional distress. They also face aggressiveness either from the patients or the families of the deceased. Moreover, forensic physicians are among the first responders in situations of mass causalities or terrorist attacks. Having to testify in court and pressure from other authorities, rushing for results, can also contribute to emotional load (van der Ploeg et al. 2003; Elliott and Daley 2013; Kelty and Gordon 2015).

Furthermore, employee well-being is a function of interaction between job-related and personal-related (individual) factors which influence each other. Individual factors matter as employees do not simply respond to work setting but rather interact using their unique characteristics making them strong predictors of work burnout (Siegrist 1996; Maslach et al. 2001; Swider and Zimmerman 2010; Bakker and Demerouti 2018).

People do not respond similarly to stress and most of them acquire individualized ways to cope with stress as a natural cognitive and behavioral attempt to stop, delay, avoid, or manage stress. These ways (coping) are tailored according to a person's social and emotional resources and his emotional and psychological tools and could be a key moderating determinant of chronic stress outcome and an important predictor of an individual's burnout level (Zeidner and Saklofske 1996; Shin et al. 2014).

Coping efforts involve adaptive coping by either challenging the problem causing distress (problem-based coping) by acting on the environment or oneself or by the use of thoughts and activities to manage distress and tolerate the demanding emotional reactions (emotion-based coping). On the other hand, in maladaptive coping, the person attempts to deny or escape stressors and the stress is temporarily alleviated (Folkman 2013; Shin et al. 2014; Demerouti 2015).

Although numerous worldwide researchers have investigated burnout among different first responders' groups, there are very few studies on forensic physicians. Nonetheless, to the extent of our knowledge, no research has been conducted on forensic physicians' burnout in Egypt. Thus, this study aims to measure burnout among Egyptian forensic physicians, determine its associated factors, and describe their coping strategies.

Methods

Study design and locality

This national observational descriptive cross-sectional study was conducted in Egypt from 1 July 2020, until the end of August 2020. It included forensic physicians working in the Egyptian Forensic Medicine Authority offices, affiliated to the Ministry of Justice, in different governorates.

Study population and size

This study targeted all 152 Egyptian forensic physicians (97 forensic examiners and 55 forensic pathologists) employed for at least 1 year. Out of 152 approached forensic physicians, a total of 133 physicians agreed to participate in the study with an 87.5% response rate. Non-participating physicians were not interested in the study.

Study tools

A predesigned self-administered questionnaire (in English) was created after an extensive literature review and based on related studies (Elliott and Daley 2013; Iorga et al. 2016; Kömür et al. 2017; Kriakous et al. 2019). It included the following:

- Personal data: age, sex, residence, marital status, smoking status, and education.
- Occupational data: work title, work duration, average working hours/day-days/week, on-call days, stressful job duties and frequency, and history of violent events.
- Maslach Burnout Inventory-Human Services Survey for Medical Personnel [MBI-HSS (MP)]: a 22-item questionnaire that was designed to measures the three core dimensions of burnout: emotional exhaustion (EE; 9 items, range 0–54), depersonalization (DP; 5 items, range 0–30), and personal accomplishment (PA; 8 items, range 0–48). Each item is rated on a 7-point Likert scale 0 = *never*, 1 = *a few times a year or less*, 2 = *once a month or less*, 3 = *a few times a month*, 4 = *once a week*, 5 = *a few times a week*, and 6 = *every day*. No total score is calculated, the MBI calculates three subscale scores, and burnout is considered present with high scores on the emotional exhaustion and depersonalization subscales and low scores on the personal accomplishment subscale (Maslach et al. 1996). The cut-off scores in terms of burnout: emotional exhaustion (EE; low ≤ 13, moderate 14–20, and high ≥ 21), depersonalization (DP; low ≤ 4, moderate 5–7, and high ≥ 8), and personal accomplishment (PA; low ≥ 34, moderate 33–29, and

high ≤ 28) (Elliott and Daley 2013; Kriakous et al. 2019). All three subscales had good levels of internal consistency (EE α = 0.90; DP α = 0.79; PA α = 0.71) and low to moderately high reliability (EE = 0.82; DP = 0.60; PA = 0.82) (Maslach et al. 1996).

- The Brief COPE Inventory: a 28 item (14 subscales) questionnaire designed to assess effective and ineffective methods to cope with a stressful life event. Each item is rated on a 4-point Likert scale: 1 = *I have not been doing this at all*, 2 = *I have been doing this a little bit*, 3 = *I have been doing this a medium amount*, and 4 = *I have been doing this a lot*. The 14 subscales can be grouped under the adaptive coping strategies (8 subscales and 16 items) and the maladaptive/dysfunctional coping strategies (6 subscales and 12 items). The adaptive coping strategies incorporate (1) problem-focused (3 subscales and 6 items) which are active coping, planning, and using instrumental support and (2) emotion-focused (5 subscales and 10 items) which are acceptance, humor, religion, positive reframing, and using emotional support. The maladaptive/dysfunctional coping strategies incorporate self-distraction, denial, venting of emotions, substance use, behavioral disengagement, and self-blame. These two strategies groups have good reliability levels (adaptive coping; α = 0.83, and maladaptive coping; α = 0.75). The individual 14 subscales reliability exceeded 0.6, except for venting, denial, and acceptance (Carver 1997; Meyer 2001; Hastings and Brown 2002; Cooper et al. 2006).

Statistical analysis

Data were collected, coded, and analyzed using IBM SPSS version 25.0. No missing data were detected. Data were tested for normality using the Kolmogorov-Smirnov test. Quantitative data were summarized as mean and standard deviation. Qualitative data were summarized as number and percent. Bivariate analysis was performed to find out factors contributing to each burnout subscale. Crude odds ratios (OR) and their 95% confidence interval (CI) were calculated. Significant associations in bivariate analysis were entered into a multivariate binary logistic regression model to identify burnout's significant independent predictors. Also, adjusted odds ratios (AOR) and their 95% confidence interval were calculated. Brief COPE groups and subscales were summarized as median (minimum-maximum). A nonparametric independent samples test (the Mann-Whitney U test) was used to compare brief COPE groups and subscales between burnout groups. Association between coping strategies and burnout subscales was tested using Spearman's correlation. $p \leq 0.05$ was considered statistically significant.

Ethical considerations

The proposal was approved by the Institutional Research Board (IRB), Faculty of Medicine-Mansoura University (Reference number R.20.04.784). Informed consent was obtained from all physicians who were willing to participate in the study after ensuring confidentiality. Permission to use and reproduce MBI-HSS (MP) was purchased and received from Mind Garden, Inc. on June 6th, 2020.

Results

Analysis of MBI-HSS (MP) of studied forensic physicians revealed different levels of burnout across the three subscales. Among forensic physicians, low, moderate, and high levels of emotional exhaustion were scored by 27.1%, 15.8%, and 57.1%, respectively. In addition, 48.1%, 14.3%, and 37.6% of them showed low, moderate, and high levels of depersonalization, respectively. Finally, 66.2%, 9.8%, and 24.1% of them had low, moderate, and high levels of personal accomplishment, respectively.

Because of the cruciality of burnout, moderate/high levels of burnout were combined for further analysis. Moderate/high levels of burnout were scored by 72.9%, 51.9%, and 75.9% of forensic physicians in the emotional exhaustion, depersonalization, and personal accomplishment subscales; respectively.

Bivariate analysis of factors associated with moderate/high levels of burnout in the emotional exhaustion subscale showed that those with higher scores are more likely to be males, current smokers, forensic examiners, travels to work, have on-call days, and perform stressful duties more than five times per month (Table 1). Logistic regression of those significant factors showed that being a forensic examiner AOR, 3.1; 95% CI [1.3, 7.6] and facing stressful duties more than five times per month AOR, 4.4; 95% CI [1.6, 12.3] were the significant independent predictors of high emotional exhaustion scores (Table 2).

Besides, higher depersonalization subscale scores were reported in males younger than 39 years, current smokers, forensic examiners, less than 12 years of work experience, having on-call days, and dealing with stressful duties more than five times per month (Table 1). The only significant independent predictor of high depersonalization scores was being a forensic examiner AOR, 22.8; 95% CI [8.0, 64.8] (Table 2).

Moreover, lower personal accomplishment was scored by females, those who worked in the same resided city, and those who worked for less than 12 years (Table 1). Being a female was the lone significant independent predictor of low personal accomplishment scores AOR, 3.0; 95% CI [1.3, 6.8] (Table 2).

Table 3 shows the most stressful job duties, as reported by forensic physicians. Defending their reports in

Table 1 Bivariate analysis of factors associated with moderate/high burnout levels among forensic physicians ($N = 133$)

Factor		Total	Emotional exhaustion		Depersonalization		Personal accomplishment	
		n (%) [a]	*n* (%)	COR (95% CI)	*n* (%)	COR (95% CI)	*n* (%)	COR (95% CI)
Overall		133	97 (72.9)		69 (51.9)		101 (75.9)	
Sex	Male	56 (42.1)	**49 (87.5)*** **	4.2 (1.7–10.6)	**42 (75.0)*** **	5.6 (2.6–12.0)	36 (64.3)	*r* (1)
	Female	77 (57.9)	48 (62.3)	*r* (1)	27 (35.1)	*r* (1)	**65 (84.4)*** **	3.0 (1.3–6.8)
Age (years)	≤ 39	73 (54.9)	55 (75.3)	1.3 (0.6–2.8)	**44 (60.3)***	2.1 (1.1–4.3)	58 (79.5)	1.5 (0.7–3.4)
	> 39	60 (45.1)	42 (70.0)	*r* (1)	25 (41.7)	*r* (1)	43 (71.7)	*r* (1)
Marital status	Never	11 (8.3)	7 (63.6)	*r* (1)	4 (36.4)	*r* (1)	7 (63.6)	*r* (1)
	Ever	122 (91.7)	90 (73.8)	1.6 (0.4–5.9)	65 (53.3)	2.0 (1.0–4.2)	94 (77.0)	1.9 (0.5–7.0)
Education	Bachelor	29 (21.8)	22 (75.9)	1.2 (0.5–3.1)	15 (51.7)	*r* (1)	21 (72.4)	*r* (1)
	Higher	104 (78.2)	75 (72.1)	r (1)	54 (51.9)	1 (0.4–2.3)	80 (76.9)	1.3 (0.5–3.2)
Smoking	Non-smoker	110 (82.7)	75 (68.2)	*r* (1)	51 (46.4)	*r* (1)	87 (79.1)	2.4 (0.9–6.3)
	Current smoker	23 (27.3)	**22 (95.7)*** **	10.3 (1.3–79.3)	**18 (78.3)*** **	4.2 (1.4–12.0)	14 (60.9)	*r* (1)
Children	No	16 (12.1)	11 (68.8)	*r* (1)	7 (43.8)	*r* (1)	11 (68.8)	*r* (1)
	Yes	117 (87.9)	86 (73.5)	1.3 (0.4–3.9)	62 (53.0)	1.4 (0.5–4.2)	90 (76.9)	1.5 (0.5–4.7)
Work title	Examiner	87 (65.4)	**74 (85.1)*** **	5.7 (2.5–13.0)	**64 (73.6)*** **	22.8 (8.0–64.8)	63 (72.4)	*r* (1)
	Pathologist	46 (34.6)	23 (50.0)	*r* (1)	5 (10.9)	*r* (1)	38 (82.6)	1.8 (0.7–4.4)
Cities$	Same city	108 (81.2)	74 (68.5)	*r* (1)	53 (49.1)	*r* (1)	**86 (69.6)***	2.6 (1.0–6.6)
	Different city	25 (18.8)	**23 (92.0)***	5.3 (1.2–23.7)	16 (64.0)	1.8 (0.7–4.5)	15 (60.0)	*r* (1)
Working years	≤ 12	70 (52.6)	52 (74.3)	1.2 (0.5–2.5)	**45 (64.3)*** **	2.9 (1.4–5.9)	**58 (82.9)***	2.2 (0.9–5.1)
	> 12	63 (47.4)	45 (71.4)	*r* (1)	24 (38.1)	*r* (1)	43 (68.3)	*r* (1)
Working days/week	≤ 4	103 (77.4)	73 (70.9)	*r* (1)	50 (48.5)	*r* (1)	80 (77.7)	1.5 (0.6–3.7)
	> 4	30 (22.6)	24 (80.0)	1.6 (0.6–4.4)	19 (63.3)	1.8 (0.8–4.2)	21 (70.0)	*r* (1)
Working hours/day	≤ 6	68 (51.1)	51 (75.0)	1.2 (0.6–2.7)	40 (58.8)	1.8 (0.9–3.5)	51 (75.0)	*r* (1)
	> 6	65 (48.9)	46 (70.8)	*r* (1)	29 (44.6)	*r* (1)	50 (76.9)	1.1 (0.5–2.5)
On-call/month	No	60 (45.1)	37 (61.7)	*r* (1)	20 (33.3)	*r* (1)	41 (68.3)	*r* (1)
	≤ 4	50 (37.6)	**41 (82.0)***	2.8 (1.2–7.0)	**34 (68.0)*** **	4.3 (1.9–9.5)	41 (82.0)	2.1 (0.9–5.2)
	> 4	23 (17.3)	**19 (82.6)***	3.0 (0.9–9.8)	**15 (65.2)*** **	3.8 (1.4–10.3)	19 (82.6)	2.2 (0.7–7.4)
Stressful duties/month	≤ 5	75 (56.4)	45 (60.0)	*r* (1)	33 (44.0)	*r* (1)	60 (80.0)	1.7 (0.7–3.7)
	> 5	58 (43.6)	**52 (89.7)*** **	5.8 (2.2–15.1)	**36 (62.1)***	2.1 (1.0–4.2)	41 (70.7)	*r* (1)
Violent event/last year	No	90 (67.7)	66 (73.3)	1.8 (0.6–5.7)	48 (53.3)	1.3 (0.4–3.9)	67 (74.4)	*r* (1)
	≤3	28 (21.0)	22 (78.6)	2.4 (0.6–9.6)	14 (50.0)	1.1 (0.3–4.0)	22 (78.6)	1.3 (0.5–3.5)
	> 3	15 (11.3)	9 (60.0)	*r* (1)	7 (46.7)	*r* (1)	12 (80.0)	1.4 (0.4–5.3)

Note: *COR* = crude odds ratio, *r* = reference

*, *** significant at $p \leq 0.05$, ≤ 0.001, respectively

[a]Column %, otherwise row %

[b]Residence and work cities

Table 2 Multivariate logistic regression analysis of independent predictors of moderate/high burnout levels among forensic physicians ($N = 133$)

Factors	Emotional exhaustion			Depersonalization			Personal accomplishment		
	β	*p*	AOR (95% CI)	*β*	*p*	AOR (95% CI)	*β*	*p*	AOR (95% CI)
Gender									
Male	–	–	–	–	–	–			*r* (1)
Female							1.1	0.009	3.0 (1.3–6.8)
Work title									
Examiner	1.1	0.013	3.1 (1.3–7.6)	3.1	< 0.0001	22.8 (8.0–64.8)	–	–	–
Pathologist			*r* (1)			*r* (1)			
Stressful duties/month									
≤ 5			*r* (1)	–	–	–	–	–	–
> 5	1.4	0.004	4.4 (1.6–12.3)						

Note: *AOR* = adjusted odds ratio, *r* = reference

Table 3 Stressful job duties as reported by forensic physicians ($N = 133$)

Forensic examiners ($n = 87$):	*n* (%)*
1. Defending reports in court.	56 (64.4)
2. Attending legal execution procedures.	49 (56.3)
3. Exhumation of corpses, examination, and autopsy.	45 (51.7)
4. Examination of victims of sexual assault.	39 (44.8)
5. Examination of children as victims of physical or sexual abuse.	32 (36.8)
6. Deciding on medical malpractice cases.	24 (27.6)
7. Performing autopsies.	21 (24.1)
8. Examination of victims of domestic violence.	13 (14.9)
9. Identification and determination of the cause of death in mass casualties.	12 (13.8)
10. Deciding on the medical release of prisoners.	11 (12.6)
11. Evaluation of the mental state of accused in criminal cases.	9 (10.3)
12. Examination of injured persons to determine severity and disability.	7 (8)
13. Examination of homicidal, work-related, and accidental injuries	7 (8)
Forensic pathologists ($n = 46$):	*n* (%)*
1. Defending reports in court.	37 (80.4)
2. Preparation and examination of corpses specimens.	21 (45.7)
3. Examining crime scene evidence.	6 (13)
4. Paternity cases.	6 (13)
5. Laboratory examination of blood, urine, semen, and abortus.	5 (10.9)

*Responses are not mutually exclusive

court, attending legal execution procedures, the exhumation of corpses and their autopsy, and examining victims of sexual assault and victimized children were the top 5 duties reported by forensic examiners as most stressful. For forensic pathologists, defending reports in court, and preparing and examining corpses' specimens were the most stressful duties. About 44% of all forensic physicians perform those stressful duties more than five times/month.

Forensic physicians' most frequent adopted coping strategies were religion, planning, and acceptance, regularly practiced by 84.9%, 72.9%, and 68.4%, respectively (data not shown in tables). The frequency of coping strategies practiced by forensic physicians with low burnout levels and moderate/high levels was compared (Table 4). Within the emotional exhaustion subscale, forensic physicians with high EE scores practiced maladaptive/dysfunctional coping significantly more than those with low EE scores (Table 4). Within the depersonalization subscale, religion and behavioral disengagement were significantly more practiced by forensic physicians with high DP scores, and they employed active coping significantly less (Table 4). Lastly, within the personal accomplishment subscale, adaptive coping, including problem-focused (active coping and planning) and emotion-focused (acceptance, positive reframing, and humor), were significantly less used by forensic physicians with low PA scores. They also used self-distraction significantly less (Table 4).

Correlation between burnout subscales and coping strategies were explored. Emotional exhaustion was significantly positively correlated with religion and behavioral disengagement. Depersonalization was significantly negatively correlated with active coping. Meanwhile, personal accomplishment was significantly positively correlated with almost all forms of coping strategies namely, adaptive coping, including problem-focused

Table 4 Coping strategies among forensic physicians with low and moderate/high levels of burnout ($N = 133$)

Brief COPE Questionnaire subscales		Emotional exhaustion		Depersonalization		Personal accomplishment	
Median (min–max)		Low BO ($n = 36$)	High BO ($n = 97$)	Low BO ($n = 64$)	High BO ($n = 69$)	Low BO ($n = 32$)	High BO ($n = 101$)
I. Adaptive coping	48 (22–64)	45 (27–64)	48 (22–64)	48 (27–64)	47 (22–64)	49 (34–64)	**46 (22–64)***
• *Problem-focused:*	18 (6–24)	18 (11–24)	18 (6–24)	18 (11–24)	18 (6–24)	18.5 (12–24)	**18 (6–24)***
Active coping	6 (2–8)	6 (3–8)	6 (2–8)	6 (3–8)	**5 (2–8)*****	6 (3–8)	**6 (2–8)*****
Planning	6 (2–8)	6 (4–8)	6 (2–8)	6 (4–8)	6 (2–8)	7 (4–8)	**6 (2–8)****
Use of instrumental support	6 (2–8)	6 (2–8)	6 (2–8)	6 (2–8)	6 (2–8)	6 (2–8)	6 (2–8)
• *Emotion-focused:*	29 (15–40)	27 (16–40)	30 (15–40)	30 (16–40)	29 (15–40)	31 (21–40)	**28 (15–40)***
Religion	8 (2–8)	6.5 (2–8)	8 (4–8)	7 (2–8)	**8 (4–8)***	7 (4–8)	8 (2–8)
Use of emotional support	6 (2–8)	4.5 (2–8)	6 (2–8)	6 (2–8)	5 (2–8)	6 (2–8)	5 (2–8)
Acceptance	6 (2–8)	6 (3–8)	6 (2–8)	6 (3–8)	6 (2–8)	6.5 (4–8)	**6 (2–8)****
Positive reframing	6 (2–8)	6 (3–8)	6 (2–8)	6 (3–8)	6 (2–8)	6 (3–8)	**6 (2–8)***
Humor	5 (2–8)	4 (2–8)	5 (2–8)	5 (2–8)	5 (2–8)	6 (2–8)	**4 (2–8)***
II. Maladaptive/dysfunctional coping:	24 (12–42)	22 (14–42)	**25 (12–37)***	25 (14–42)	24 (12–36)	25 (15–35)	24 (12–42)
Venting	6 (2–8)	5 (2–8)	6 (2–8)	6 (2–8)	5 (2–8)	6 (3–8)	5 (2–8)
Self-distraction	5 (2–8)	5 (2–8)	6 (2–8)	6 (2–8)	5 (2–8)	6 (4–8)	**5 (2–8)***
Denial	4 (2–8)	3.5 (2–8)	4 (2–7)	4 (2–8)	4 (2–7)	3.5 (2–7)	4 (4–8)
Behavioral disengagement	4 (2–8)	3 (2–8)	4 (2–8)	3.5 (2–8)	**4 (2–8)***	4 (2–6)	4 (2–8)
Self-blame	4 (2–8)	4 (2–8)	4 (2–8)	5 (2–8)	4 (2–8)	5 (2–8)	4 (2–8)
Substance use	2 (2–8)	2 (2–8)	2 (2–8)	2 (2–8)	2 (2–6)	2 (2–6)	2 (2–8)

Note: *BO* = burnout
*, **, *** significant at $p \leq 0.05$, ≤ 0.01, and ≤ 0.001, respectively

(active coping, planning, and instrumental support) and emotion-focused (religion, emotional support, acceptance, positive reframing, and humor), and maladaptive/dysfunctional coping including venting and self-distraction (Table 5).

Discussion

Forensic experts' work environment is a dynamic one where shared stressful work demands across different work environments exist, including, among others, workload, difficult working hours, and lack of career development. Besides, forensic work's specific nature heightens their stress levels, and the repeated exposures to traumatic experiences can result in burnout. Frequent calls to crime scenes, horrible case details, working within the legal system, and the expectation of zero errors are a few of these unique stressors (Jeanguenat and Dror 2018; Almazrouei et al. 2020).

The current study found that 72.9%, 51.9%, and 75.9% of forensic physicians experienced moderate/high levels of burnout in the emotional exhaustion, depersonalization, and personal accomplishment subscales, respectively.

Previous research had found a variable prevalence of burnout among forensic experts. van der Ploeg et al. (2003) reported high scores on emotional exhaustion and depersonalization, and a low score on personal accomplishment among 25.0%, 40.5%, and 20.2% of forensic doctors, respectively. Comparable results, 31.9%, 27.4%, and 22.2%, respectively, were reported by Elliott and Daley (2013). Whereas Kömür et al. (2017) reported that 14% were highly emotionally exhausted, 32.4% were highly depersonalized, and 76.1% had a low sense of personal accomplishment level among mortuary staff members. The current study took moderate burnout levels into consideration, which mostly accounts for differences in prevalence.

The current study showed that higher scores of emotional exhaustion and depersonalization were reported in men, while females reported lower personal accomplishment scores. Previous research was inconsistent about the role of gender in burnout. Some research found no difference between males and females in any subscale (Iorga et al. 2016; Kömür et al. 2017). Other research found that males had higher personal accomplishment scores, burnout levels, depersonalization scores, or male gender is a risk factor of burnout (Ebling and Carlotto 2012; Howlett et al. 2015; Padyab et al. 2016; Queirós et al. 2020). On the other hand, further research found that females are at higher risk of burnout or report higher levels of burnout subscales (Cieslak et al. 2014; García-Rivera et al. 2020). Most studies

Table 5 Spearman's correlation coefficients between coping strategies and burnout subscales among forensic physicians ($N = 133$)

Brief COPE subscales	EE	DP	PA
I. Adaptive coping	0.11	− 0.09	**0.39*** **
• *Problem-focused:*	0.02	− 0.16	**0.36*** **
Active coping	− 0.08	− **0.24****	**0.36*** **
Planning	0.01	− 0.15	**0.37*** **
Use of instrumental support	0.07	− 0.04	**0.26****
• *Emotion-focused:*	0.13	− 0.04	**0.41*** **
Religion	**0.28****	0.14	**0.28*** **
Use of emotional support	0.12	− 0.08	**0.30*** **
Acceptance	0.07	− 0.11	**0.39*** **
Positive reframing	− 0.02	− 0.16	**0.36*** **
Humor	0.08	0.06	**0.30*** **
II. Maladaptive/dysfunctional coping:	0.16	0.004	**0.18***
Venting	0.09	− 0.07	**0.29*** **
Self-distraction	0.43	− 0.16	**0.38*** **
Denial	0.10	0.08	− 0.01
Behavioral disengagement	**0.20***	0.15	− 0.03
Self-blame	− 0.004	− 0.04	− 0.03
Substance use	0.007	0.02	− 0.05

Note: *EE* = emotional exhaustion, *DP* = depersonalization, *PA* = personal accomplishment
*, **, *** significant at $p \leq 0.05$, ≤ 0.01, and ≤ 0.001, respectively

referred to such discrepancies as differences between males and females in viewing stress and used coping mechanisms (Elliott and Daley 2013; Cieslak et al. 2014).

Furthermore, the current study showed that younger forensic physicians are more depersonalized, and those with less work experience are more depersonalized and had less perception of personal accomplishment. According to previous research, it was found that the older the individual and the more years of job experience, the less the burnout is presented. The ability to develop and practice more efficient coping strategies was an accepted explanation by most authors (Ebling and Carlotto 2012; Mella and Boutin 2013; Kömür et al. 2017; Kriakous et al. 2019; Queirós et al. 2020).

Moreover, current smokers were found to suffer more emotional exhaustion and depersonalization in the current study, in agreement with a previous research which considered smoking a false reassuring stress coping mechanism (Elliott and Daley 2013).

The current study showed that forensic examiners are more prone to moderate/high burnout levels than forensic pathologists. In Egypt, forensic examiners face highly stressful or traumatic job demands like performing autopsies with terrible case details, attending executions, examining alive victims of various assaults—especially women and children—, and examining prisoners. On the other hand, forensic pathologists' job is mainly in the laboratory examining specimens from crime scenes. Similarly, Kömür et al. (2017) found higher burnout in those performing autopsies than other mortuary staff, and Iorga et al. (2016) reported higher emotional exhaustion among forensic physicians who faces critical situation.

Another occupational predictor of high emotional exhaustion and depersonalization noted by the current study is having on-call days where forensic physicians can be called out anytime during the day. Previously, Elliott and Daley (2013) found that working shifts was a significant predictor of high emotional exhaustion, while Kriakous et al. (2019) reported it as a significant predictor of high depersonalization.

Previous studies reported that forensic professionals' most disturbing cases were cases involving victimized children and women, sexual assault, decomposing or mutilated bodies, and testifying in court. Such studies reported higher burnout levels among those exposed to these critical situations during the last 5 years (van der Ploeg et al. 2003; Iorga et al. 2016; Kömür et al. 2017; Iorga et al. 2017; Khajuria and Nayak, 2018). The current study pointed similar stressful job duties that forensic physicians with higher burnout levels face more than five times per month.

Coping skills are essential in shaping how individuals respond to traumatic experiences and could be crucial in determining burnout level (Kelty and Gordon 2015). The current study explored the most frequent coping strategies used by forensic physicians which were mainly adaptive coping strategies. Those with moderate/high burnout levels practiced maladaptive coping and religion significantly more, while practiced problem-focused and emotion-focused (except religion) significantly less.

Previous research noted that the most commonly used coping strategies by forensic professionals are adaptive coping strategies. Salinas and Webb (2018) reported their frequent use of active coping, planning, and acceptance. Besides, a range of problem-focused and emotion-focused coping strategies used by forensic professionals were reported by Elliott and Daley (2013). Moreover, Horvath and Massey (2018) reported that the top 8 strategies, out of 10, used were positive strategies, and planning, active coping, acceptance, religion, instrumental, and social support were the most used (Mella and Boutin 2013).

Furthermore, analysis of the relationship between burnout dimensions and coping strategies in the current study showed a positive association between emotional exhaustion and religion and behavioral disengagement and a negative association between depersonalization and active coping. A positive association between

personal accomplishment level and most coping strategies was also stated.

In agreement with the current study, a negative association between problem-focused coping strategies, including active coping, and burnout dimensions' levels (lower EE and DP, and higher PA) was reported by several studies, and such strategies were seen as a protective factor against burnout. On the other hand, maladaptive coping, including behavioral disengagement, was found to be significantly positively associated with and predicted higher burnout dimensions' levels (higher EE and DP, lower PA) (Elliott and Daley 2013; Mella and Boutin 2013; Shin et al. 2014; Howlett et al. 2015; Kömür et al. 2017; Salinas and Webb 2018; Tran 2018; Kriakous et al. 2019).

Previous studies' reports were inconsistent regarding emotion-focused coping strategies, including religion, humor, and emotional support. Most research, following the current study, found a positive association between it and burnout levels (higher EE and DP, lower PA), which was justified by suggesting that when individuals become more emotionally distressed, they use coping mechanisms more (Shin et al. 2014; Mella and Boutin 2013; Howlett et al. 2015; Horvath and Massey 2018; Tran 2018).

On the other hand, a negative association between emotion-focused coping and burnout dimensions' levels (lower EE and DP, and higher PA) was described, which was explained by being a form of adaptive coping. However, the author mentioned that extreme (very high or deficient) use of emotion-focused coping decreases personal accomplishment and when the use of emotion-focused coping exceeds the use of problem-focused coping, personal accomplishment decreases, and exhaustion increases (García-Arroyo and Osca 2017).

Despite being a national study, the sample size is small. Also, the possibility of over-expression of burnout by participants or that subjects suffering from burnout refused to participate cannot be excluded. Another limitation is the cross-sectional design; no causal relationship neither between chronic work environment stressors and burnout dimensions nor between burnout and coping could be determined.

Conclusions

In conclusion, the current study shows a high prevalence of burnout among Egyptian forensic physicians. For the three dimensions of burnout, the significant independent predictors of high EE were being a forensic examiner and facing stressful job duties more than five times per month, of high DP was being a forensic examiner, and of low PA was being a female. The most used coping strategies were adaptive coping with a significant negative correlation to burnout levels.

Recommendations

Because of forensic work's unique nature, it is sensible to acknowledge the traumatic experiences and their harmful psychological impact, such as burnout. In a try to reduce such problem and its negative consequences, the following recommendations are proposed. It is recommended to include psychological assessments of potential forensic physicians in the recruitment process and a comprehensive initiation program on acceptance. Regular stress management training programs/seminars could help in prevention of burnout and promote coping. These programs should invest in education about stressors, stress reactions, coping strategies, and available resources. They should address different age, gender, job duties, and experience and consider coping strategies' combined effect. On-demand professional counseling and help should be made available. Periodic assessment of forensic physicians' psychological well-being should also be implemented.

Abbreviations

AOR: Adjusted odds ratio; CI: Confidence interval; DP: Depersonalization; EE: Emotional exhaustion; JD-R: Job demands-resources; MBI-HSS (MP): Maslach Burnout Inventory-Human Services Survey for Medical Personnel; OR: Crude odds ratios; PA: Personal accomplishment

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Authors' contributions

RS contributed to the idea of the research, study design, analysis, interpretation of the data, and writing of research. MHG contributed to the idea of the research, study design, collection of data, and supervision of the work. AE contributed to study design, data analysis, and revision of manuscript writing critically. AAA conducted the retrieval of the literature and contributed to study design. All the authors have read and approved the final manuscript.

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Availability of data and materials

Data are available upon reasonable request from the corresponding author.

Declarations

Ethics approval and consent to participate

The proposal was approved by the Institutional Research Board (IRB), Faculty of Medicine-Mansoura University (Reference number R.20.04.784). Written informed consent was obtained from all physicians who were willing to participate in the study after ensuring confidentiality. Permission to use and reproduce MBI-HSS (MP) was purchased and received from Mind Garden, Inc. on 6 June 2020.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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