EUROPEAN JOURNAL OF
PSYCHO-
TRAUMATOLOGY
THE OFFICIAL JOURNAL OF THE EUROPEAN SOCIETY FOR TRAUMATIC STRESS STUDIES

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The prevalence of exposure to potentially morally injurious events among physicians during the COVID-19 pandemic

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ABSTRACT

Background: Given the profound psychological distress caused by the Covid-19 pandemic, healthcare workers are at high risk of being exposed to potentially morally injurious events (PMIEs).

Objective: We aimed to explore the prevalence and associated factors with PMIEs in a sample of Romanian physicians, of which almost half worked in Covid-19 treatment medical units.

Method: We ran a web-based survey in April 2020, three weeks after the general lockdown to contain the novel coronavirus. Participants ($N = 114$, aged 23 to 67, $M = 38.85$, $SD = 9.82$, 74.6% females) answered the PMIE scale items, in addition to questions related to the physical and emotional self-impact related questions, and demographical and work-related variables (i.e. age, gender, medical experience, and speciality).

Results: Results suggested that almost 50% of the participants reported high levels of PMIE exposure. No significant associations were found between PMIE exposure, and the type of medical unit physicians worked in (Covid-19 or non-Covid-19), nor their specialization and medical experience. Demographic variables (i.e. age and gender) and experience did not predict PMIE exposure. However, we found significant associations between PMIE and the physicians' physical and emotional self-reported impact.

Conclusions: Healthcare systems, governments, and societies worldwide need to recognize that physicians are prone to PMIE exposure and related adverse psychological outcomes due to their daily activity in containing the pandemic. Public policies need to actively offer and promote psychological support, to protect and help physicians from the adverse mental health outcomes following the pandemic.

Prevalencia de la exposición a eventos potencialmente causantes de daño moral entre médicos durante la pandemia por la COVID-19

Antecedentes: Dado el profundo malestar psíquico causado por la pandemia de la COVID-19, el personal de salud tiene un alto riesgo de estar expuesto a eventos potencialmente causantes de daño moral (EPDMs).

Objetivo: Nuestro objetivo fue explorar la prevalencia y los factores asociados a EPDMs en una muestra de médicos rumanos, de los cuales casi la mitad trabajaba en unidades médicas de tratamiento de la COVID-19.

Métodos: Realizamos un cuestionario en línea en abril del 2020, tres semanas después del confinamiento general para contener al nuevo coronavirus. Los participantes ($N =114$, de 23 a 67 años, $M =38.85$, $SD =9.82$, 74.6% mujeres) respondieron a los elementos del cuestionario para EPDMs, además de preguntas relacionadas con la autoevaluación del impacto físico y emocional, así como variables demográficas y relacionadas con el trabajo (por ejemplo, la edad, el género, la experiencia médica y la especialidad).

Resultados: Los resultados sugirieron que casi el 50% de los participantes reportaron niveles altos de exposición a EPDMs. No se encontraron asociaciones significativas entre la exposición a los EPDMs y el tipo de unidad médica en la que trabajaban los médicos (COVID-19 o no COVID-19), ni con la especialidad o la experiencia médica. Las variables demográficas (como la edad y el género) y la experiencia no predijeron la exposición a EPDMs. Sin embargo, encontramos asociaciones significativas entre los EPDMs y la autoevaluación del impacto físico y emocional de los médicos.

Conclusiones: Los sistemas de salud, los gobiernos y las sociedades en todo el mundo deben reconocer que los médicos, debido a su actividad diaria para contener la pandemia, son propensos a estar expuestos a EPDMs y a las consecuencias psicológicas adversas con las que estos se relacionan. Las políticas públicas necesitan ofrecer y promover activamente soporte psicológico a los médicos para protegerlos de y ayudarlos con las consecuencias adversas para la salud mental que devienen de la pandemia.

HIGHLIGHTS
• We explored the prevalence and associated factors of PMIE in a sample of Romanian physicians, in April 2020.
• Results suggested that 50% of the physicians reported high levels of PMIE exposure.
• We found significant associations between PMIE and the physicians' physical and emotional self-reported impact.

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在Covid-19疫情期间医生遭遇潜在道德伤害事件的流行率

背景: 鉴于Covid-19疫情引起的严重心理困扰, 医护人员有很大风险遭遇潜在道德伤害事件 (PMIE) 。

目的: 我们旨在考查一个罗马尼亚医生样本中PMIE的流行率及其相关因素, 这些医生中近一半在Covid-19治疗医疗单位工作过。

方法: 在为遏制新型冠状病毒实施的三周全面封锁后, 我们于2020年4月进行了网络在线调查。参与者 (N = 114, 年龄在23至67岁之间, M= 38.85, SD = 9.82, 女性占74.6%) 回答了PMIE量表条目, 还有身体和情感相关自我影响, 以及人口统计学和工作相关变量 (即年龄, 性别, 医疗经验和专业) 的问题。

结果: 结果表明, 几乎50%的参与者报告了高水平的PMIE暴露。没有发现PMIE暴露与医生所在医疗工作单位的类型 (Covid-19或非Covid-19), 及其专业知识和医疗经验之间存在显著关联。人口统计学变量 (即年龄和性别) 和经验无法预测PMIE暴露。但是, 我们发现PMIE与医生自我报告的身体和情绪相关影响之间存在显著关联。

结论: 全世界的医护系统, 政府和社会都需要认识到, 医生由于日常参与遏制疫情的活动, 很容易发生PMIE暴露和相关不良心理后果。公共政策需要积极提供和促进心理支持, 以保护和帮助医生预防疫情后的不良心理健康结果。

1. Introduction

Since its outbreak in March 2020, the Coronavirus disease epidemic (Covid-19; severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2] shifted people's lives, creating a complex system of stressors (Javakhishvili et al., 2020). Health systems and healthcare professionals worldwide face significant challenges, as the number of infections has already reached more than sixty million. In addition to the already high prevalence of burnout among healthcare providers (Sibeoni et al., 2019), the pandemic adds new emotional, physical, and moral stressors. Due to the shortage of medical staff caused by the high number of Covid-19 patients, healthcare professionals often have to care for severely ill patients that they are generally not trained for (Society of Critical Care Medicine, 2020), increasing the pandemics' emotional burden (Talaee et al., 2020).

Due to the high infection rate, the high workload, and lack of sufficient medical supplies (e.g. mechanical ventilators), in addition to challenging ethical scenarios (i.e. distribution of resources when patient needs exceed available medical supplies), potential guilt and shame generated by the inability to save patients' lives (Shanafelt, Ripp, & Trockel, 2020), healthcare professionals are highly prone to be exposed to potentially morally injurious events (PMIEs) and subsequent psychological distress during the current pandemic. In Romania, since the beginning of the pandemic (March 2020), hospitals lacked sufficient mechanical ventilators and faced numerous challenges such as the insufficient number of hospital beds, poor management, the breach of protocols, lack of medical staff and protection gear, and high hospital infection rates (Dascalu, 2020).

2. Moral injury and potentially morally injurious events

Moral injury (MI) refers to a lasting injury that goes beyond what can be considered a normal human response, lying at the extreme end of the range of harms that might result from events that involve moral stressors (Litz & Kerig, 2019). When experiencing MI, an individual's conscience and values are injured, generating profound emotional guilt, shame, a sense of betrayal (Haleigh, Hurley, & Taber, 2019), anger, and moral disorientation (Molendjik, 2018). In contrast to PTSD, MI is not a diagnosable disorder or clinical condition (i.e. PTSD is a psychiatric illness, while moral injury is not). Though MI shares several similarities with PTSD, mostly in criterion D (i.e. the affective domain; DSM-5: feelings of guilt, shame, betrayal, loss of trust; Jordan, Eisen, Bolton, Nash, & Litz, 2017), there are many noteworthy differences between the two concepts. For example, in contrast to index trauma related to life threat, MI is more related to the emotions that developed subsequent to the event, rather than emotions experienced during the event (Barnes, Hurley, & Taber, 2019). Also, the focus on PTSD is on the fear-related symptoms; meanwhile, MI focuses more on guilt, shame, anger, and disgust (Farnsworth, Drescher, Nieuwsma, Walser, & Currier, 2014).

Researchers generally agree on three MI primary features: (a) the experience of events that cause significant moral dissonance; (b) the presence of core symptoms, such as guilt, shame, spiritual or existential conflicts, and a loss of trust in self, other, or ultimate/transcendental beings; and (c) the presence of secondary symptoms, such as depression, anxiety, anger, re-experiencing of the moral conflict, or social problems" (Held, Klassen, Zalta, & Pollack, 2017, p. 401). Litz and Kerig (2019) proposed in their heuristic continuum of morally relevant life experiences and corresponding responses, that 'experiences that are ongoing or have no immediate self-relevance are potential moral challenges that may reach a discernable but normal level of moral frustration' (i.e. worries about the climate change) (p. 432). These moral challenges resulting in moral frustration are followed by moral stressors (self-referential events,

with a specific focus on moral emotions, i.e. infidelity), resulting in moral distress.

Potentially morally injurious events (PMIE) resulting in MI are less frequent than moral stressors but involve significant threats to personal integrity and potentially chronic symptoms and problems. PMIE include unintentional errors leading to injury or death, witnessing and/or failing to prevent harm or death, the transgression of peers, leaders or organizations that betrayed one's moral/ethical beliefs or expectations, the loss of life to a vulnerable, leaders that do not take responsibility for the event(s) and are generally unsupportive of staff, lack of social support following PMIE (Williamson, Murphy, & Greenberg, 2020).

In the current COVID-19 pandemic, contextual constraints (e.g. lack of medical supplies such as limited mechanical ventilators available for ICU COVID-19 patients; White & Lo, 2020), low staffing availability (primarily due to their infection with the novel coronavirus), various ethically challenging emergency decisions related to source allocation, and, sometimes, ethical disparities (Williamson et al., 2020) may also be considered as PMIEs, given their profound psychological costs among physicians and medical healthcare workers, in general. Previous PMIEs research suggested that women reported more witnessing- and betrayal-based PMIEs (Maguen et al., 2020), and younger individuals may be more prone to experience MI (e.g. LaFrance, Vo, Baird, East, & Stein, 2020). However, no data is yet available for gender and age differences concerning PMIE exposure among physicians.

3. The present study

We aimed to explore the prevalence and associated factors and predictors of PMIEs exposure, i.e. (1) demographic characteristics: age, gender, experience in the medical field (i.e. length of practice), (2) medical speciality (e.g. family medicine, internal medicine), and (3) physical and emotional self-reported impact. We were also interested in exploring the potential differences between physicians dealing with Covid-19 patients and physicians who do not directly treat Covid-19 patients. We expected significant differences between the two groups in terms of PMIEs exposure due to the Covid-19 patient-care outcome. We included gender and age as potential predictors of PMIEs self-reported exposure, assuming that women and younger physicians might report higher levels (LaFrance et al., 2020; Maguen et al., 2020).

4. Method

We designed and ran a web-based survey in April 2020, three weeks after the general lockdown to contain the novel coronavirus. The research was approved by the Ethics Committee from the faculty where the authors are affiliated and conducted following the Declaration of Helsinki research principles. Out of the approximately 63.000 Romanian physicians (The National Institute of Statistics, 2019), around 10.000 were contacted through medical groups and emails. Participants were first presented with a consent form describing the study's general-purpose (perception of the coronavirus pandemic), the duration of the survey (around 15 minutes), and details about the absolute confidentiality and anonymity of their answers. We then addressed a series of items concerning PMIE exposure and the physical and emotional self-reported impact. The survey ended by asking participants their age, gender, professional experience within the healthcare system, speciality, and whether they treated Covid-19 patients within the medical setting they worked in. (i.e. private or public clinics or hospitals).

5. Participants

All participants voluntarily participated in the study, and no rewards were offered for participation. Our sample consisted of 114 physicians from three cities within the north-eastern region of Romania. Their age varied from 23 to 67 ($M = 38.85$, $SD = 9.82$), and 74.6% were females. According to The National Institute of Statistics (2019), 70.4% of the Romanian physicians are females. Therefore, our data is consistent with the national population of physicians in Romania. Their work experience and specializations varied (see Table 1). Almost half of the participants (46.5%) worked in medical units (i.e. clinics and hospitals) that directly treated Covid-19.

6. Measures

We used an adapted version of the Moral Injury Events Scale developed by Nash et al. (2013) to investigate the prevalence and perceived intensity of PMIE due to the current Covid-19 pandemic. The exact instructions were: 'Please indicate how much you agree or disagree with each of the following statements regarding your experiences as a physician, at any time since the Covid-19 outbreak in March 2020'. We asked participants to answer the 9-items scale (on a Likert scale ranging from 1 – strongly disagree, to 5 – strongly agree) by referring to their medical experience since the Covid-19 outbreak, specifically – in the middle of March 2020. As the authors of the scale emphasize, the PMIE can be used to measure exposure to events that contradict deeply held moral beliefs, namely their prevalence and perceived intensity. Cronbach's alpha indicated a satisfactory internal consistency of .894 for the global MPIE score). A higher score indicated that participants reported a higher prevalence and

Table 1. Descriptive statistics of the participants ($N = 114$).

Variables	N	%
Gender		
Female	95	75.4
Male	31	24.6
Length of practice	*N*	*SD*
	11.78	9.54
Speciality	*N*	*%*
undeclared	12	10.5
Family medicine	11	9.6
Plastic surgery	2	1.8
Intensive care	5	4.4
Surgery	8	7.0
Internal medicine	14	12.3
Oncology	4	3.5
Psychiatry	3	2.6
Legal medicine	3	2.6
Nephrology	6	5.3
Endocrinology	6	5.3
Paediatrics	2	1.8
Cardiology	8	7.0
Emergency medicine	4	3.5
Haematology	1	.9
Dental medicine	5	4.4
Radiology	2	1.8
Dermatovenereology	2	1.8
Obstretics and Gynaecology	5	4.4
Pneumology	2	1.8
Ophthalmology	2	1.8
Rheumatology	4	3.5
Epidemiology	2	1.8
Orthopaedics	1	.9

a higher perceived intensity of morally injurious events.

Participants ranked the physical (*How physically affected are you feeling by the current pandemic generated by Covid-19?*) and emotional impact (*How emotionally affected do you feel about the current pandemic caused by Covid-19?*) of the Covid-19 pandemic, on a Likert scale from 1 (not at all affected) to 5 (extremely affected). Previous research highlighted the physiological reactivity to trauma exposure (e.g. Badour & Feldner, 2013; Williamson, Porges, Lamb, & Porges, 2015) and the emotional impact of PMIE exposure (e.g. Maguen et al., 2020). Therefore, we expected significant associations between self-reported physicians' physical and emotional impact, and PMIE exposure. Finally, a demographic scale assessed participants' age, gender, medical experience, speciality, and whether they treated Covid-19 patients within the medical setting they worked in.

7. Results

We used SPSS v.20. software to explore our data. We first investigated the prevalence of self-reported PMIE, considering that the lowest possible score was 9, and the highest possible was 45. In the current sample, the PMIE scores ranged from 9 to 43, with a median score of 24.00. Our data suggested that 46.8% ($N = 59$) of the physicians in our sample scored above the PMIE median. Table 2 presents a detailed overview of the various morally injurious

events that the participants endorsed, i.e. perceived transgressions: witnessing acts of commission, distress resulting from others' and own acts of commission and omission, perpetration of acts of commission and omission) and perceived betrayals (by leaders and fellow physicians) in both COVID-19 and non-COVID-19 groups, as well as the overall sample.

We split participants into two groups, depending on the medical unit they worked in (i.e. with or without Covid-19 patients). T-test results indicated no significant differences between the groups in terms of perceived exposure to morally injurious events [$t(112) = 740$, $p = .461$] or depression [$t(112) = 1.84$, $p = .068$]. We also investigated the associations between the main variables (age, medical experience, emotional and physical self-perceived impact, and PMIE; see Table 3). Results suggested no significant associations between PMIE and the physicians' specialization ($X^2(690) = 686.55$, $p = .530$). However, we found significant associations in both groups related to PMIE and physicians' emotional and physical self-reported impact. More specifically, in the non-Covid-19 group, we found significant associations between PMIE and physicians' self-reported physical impact ($r = .376$, $p = .003$) and a marginally significant association between PMIE and emotional impact ($r = .249$, $p = .053$). In the Covid-19 group, we found significant associations between PMIE and physicians' self-reported physical impact ($r = .424$, $p = .002$) and emotional impact ($r = .454$, $p = .001$).

We performed a preliminary analysis series before computing a linear hierarchical regression to ensure the necessary conditions for the intended analysis (normality, multi-collinearities, variance inflation factor (VIF) values, and homoscedasticity. We conducted a multiple regression with PMIE scores (perceived exposure and intensity to morally injurious events) as the dependent variable, gender, age, and medical experience as predictors. The multiple regression revealed that the proposed variables did not contribute significantly to the regression model, $F(3, 110) = .328$, $p = .805$). Regression statistics are detailed in Table 4.

8. Discussion

In both the physician samples working in the Covid 19 and non-Covid 19 units, we found positive, significant correlations between PMIE exposure and physicians' physical and emotional impact. An overview of the PMIE that the participants endorsed, i.e. perceived transgressions and perceived betrayals, suggested that, in both COVID-19 and non-COVID-19 groups, participants expressed similar rates of perceived transgressions (e.g. 'I am troubled by having acted in ways that

Table 2. Participants' answers to the adapted Moral Injury Events Scale (Nash et al., 2013) assessing PMIE in Covid-19, non-Covid-19 samples, and overall sample (N = 114).

	M	SD	Score prevalence (N; %)				
			Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Non-COVID-19 medical unit (N = 61)							
I saw things that were morally wrong.	3.19	1.23	8 (13.1%)	11 (18%)	9 (14.8%)	27 (44.3%)	6 (9.8%)
I am troubled by having witnessed others' immoral acts.	3.06	1.27	11 (18%)	8 (13.1%)	14 (23%)	22 (36.1%)	6 (9.8%)
I acted in ways that violated my own moral code or values.	2.11	1.17	23 (37.7%)	20 (32.8%)	9 (14.8%)	6 (9.8%)	3 (4.9%)
I am troubled by having acted in ways that violated my own morals or values.	2.08	1.09	24 (39.3%)	17 (27.9%)	12 (19.7%)	7 (11.5%)	1 (1.6%)
I violated my own morals by failing to do something that I felt I should have done.	2.21	1.09	17 (27.9%)	26 (42.6%)	8 (13.1%)	8 (13.1%)	2 (3.3%)
I am troubled because I violated my morals by failing to do something that I felt I should have done.	2.34	1.13	16 (26.2%)	22 (36.1%)	11 (18%)	10(16.4%)	2 (3.3%)
I feel betrayed by medical leaders who I once trusted.	2.85	1.06	6 (9.8%)	20 (32.8%)	13 (21.3%)	21 (34.4%)	1 (1.6%)
I feel betrayed by fellow medical staff who I once trusted.	2.73	1.09	9 (14.8%)	19 (31.1%)	13 (21.3%)	19 (31.1%)	1 (1.6%)
I feel betrayed by others outside the hospital/clinic who I once trusted.	2.96	1.18	10 (16.4%)	10(16.4%)	16 (26.2%)	22 (36.1%)	3 (4.9%)
COVID-19 medical unit (N = 53)							
I saw things that were morally wrong.	2.90	1.31	10 (18.9%)	13 (24.5%)	7 (13.2%)	18 (34%)	5 (9.4%)
I am troubled by having witnessed others' immoral acts.	3.03	1.35	11 (20.8%)	7 (13.2%)	11 (20.8%)	17 (32.1%)	7 (13.2%)
I acted in ways that violated my own moral code or values.	2.24	1.15	16 (30.2%)	20 (37.7%)	7 (13.2%)	8 (15.1%)	2 (3.8%)
I am troubled by having acted in ways that violated my own morals or values.	2.09	1.13	20 (37.7%)	18 (34.0%)	6 (11.3%)	8 (15.1%)	1 (1.9%)
I violated my own morals by failing to do something that I felt I should have done.	2.24	1.22	19 (35.8%)	16 (30.2%)	5 (9.4%)	12 (22.6%)	1 (1.9%)
I am troubled because I violated my morals by failing to do something that I felt I should have done.	2.24	1.20	18 (34%)	18 (34%)	4 (7.5%)	12 (22.6%)	1 (1.9%)
I feel betrayed by medical leaders who I once trusted.	3.39	1.27	4 (7.5%)	11 (20.8%)	11 (20.8%)	14 (26.4%)	13 (24.5%)
I feel betrayed by fellow medical staff who I once trusted.	3.30	1.23	5 (9.4%)	10 (18.9%)	11 (20.8%)	18 (34%)	9 (17%)
I feel betrayed by others outside the hospital/clinic who I once trusted.	3.22	1.26	5 (9.4%)	10 (18.9%)	11 (20.8%)	18 (34%)	9 (17%)
Overall sample (N = 114)							
I saw things that were morally wrong.	3.06	1.27	18 (15.8%)	24 (21.1%)	16 (14%)	45 (39.5%)	11 (9.6%)
I am troubled by having witnessed others' immoral acts.	3.05	1.30	22 (19.3%)	15 (13.2%)	25 (21.9%)	39 (34.2%)	13 (11.4%)
I acted in ways that violated my own moral code or values.	2.17	1.16	39 (34.2%)	40 (35.1%)	16 (14.0%)	14 (12.3%)	5 (4.4%)
I am troubled by having acted in ways that violated my own morals or values.	2.08	1.10	44 (38.6%)	35 (30.7%)	18 (15.8%)	15 (13.2%)	2 (1.8%)
I violated my own morals by failing to do something that I felt I should have done.	2.22	1.15	36 (31.6%)	42 (36.8%)	13 (11.4%)	20 (17.5%)	3 (2.6%)
I am troubled because I violated my morals by failing to do something that I felt I should have done.	2.29	1.16	34 (29.8%)	40 (35.1%)	15 (13.2%)	22 (19.3%)	3 (2.6%)
I feel betrayed by medical leaders who I once trusted.	3.10	1.19	10 (8.8%)	31 (27.2%)	24 (21.1%)	35 (30.7%)	14 (12.3%)
I feel betrayed by fellow medical staff who I once trusted.	3.00	1.19	14 (12.3%)	29 (25.4%)	24 (21.1%)	37 (32.5%)	10 (8.8%)
I feel betrayed by others outside the hospital/clinic who I once trusted.	3.08	1.22	15 (13.2%)	21 (18.4%)	31 (27.2%)	33 (28.9%)	14 (12.3%)

PMIE = potentially morally injurious events.

Table 3. Means, standard deviation and correlation matrix for the main variables.

	M	SD	1	2	3	4	5
Non-COVID-19 medical unit (N=61)							
1. Age	38.73	10.37	1	.901**	.001	−.113	.119
2. Working experience	12.04	10.32	.901**	1	.031	−.090	.073
3. Emotional impact	2.72	.95	.001	.031	1	.517**	.249
4. Physical impact	2.29	1.08	−.113	−.090	.517**	1	.376**
5. PMIE	23.57	7.86	.119	.073	.249	.376**	.1
COVID-19 medical unit (N=53)							
1. Age	39.00	9.25	1	.893**	.336*	−.136	.001
2. Working experience	12.60	9.12	.893**	1	.366**	−.048	.017
3. Emotional impact	3.13	.92	.336*	.366**	1	.583**	.454**
4. Physical impact	2.67	1.29	−.136	−.048	.583**	1	.424*
5. PMIE	24.69	8.34	.001	.017	.454**	.424**	.1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 4. Summary of hierarchical regression analysis for variables predicting PMIE (N = 114).

	Prediction Model		
Variables	B	SE(B)	β
Gender	1.18	1.77	.064
Age	.109	.179	.133
Work experience	−.060	.180	−.072
R^2	.009		
F for change in R^2			.328

violated my own morals or values'; 'I am troubled by having witnessed others' immoral acts') and perceived betrayals (e.g. 'I feel betrayed by fellow physicians who I once trusted'), within the pandemic context. More importantly, in the overall sample, the most morally injurious events reported by participants were related to perceived betrayals (items 7, 8, and 9). Also, our findings suggested high scores in both Covid-19 and non-Covid-19 samples concerning the perceived transgressions related to participants' exposure to moral wrongdoings (i.e. items 1 and 2, 'I saw things that were morally wrong', and 'I am troubled by having witnessed others' immoral acts').

Higher levels of self-reported negative physical and emotional consequences were associated with higher PMIE levels in both groups (i.e. Covid-19 and non-Covid-19). However, the percentages and scores on the PMIE did not differ significantly between the two groups, suggesting that physicians in both types of medical units are similarly prone to experience subsequent MI due to the PMIE exposure. One potential explanation lies in the fact that physicians generally access and use similar medical information, procedures, strategies, and medical directions related to the pandemic's evolution, regardless of their direct access to Covid-19 patients (i.e. Covid-19 or non-Covid-19 workplace status). Also, the lack of significant differences between the Covid-19 and non-Covid-19 groups may also be explained through the fact that those physicians in the non-Covid-19 group might have had other significant professional stressors such as moving to virtual care, similar to healthcare systems all over the world (e.g. Elkaddoum, Haddad, Eid, & Kourie, 2020).

Additionally, although the perceived emotional impact could be higher for those who directly treat Covid-19 patients (as our data suggested), the emotional overload due to the uncertainty surrounding the pandemic and the lack of efficient treatments may have similar psychological outcomes. This latter assumption might be supported by the lack of significant associations between participants' medical experience, specialization, and self-reported PMIE exposure. This specific result suggests that regardless of their field and medical experience, the pandemic's traumatic and morally injurious character seems to be non-discriminatory.

Our study has significant limitations. First, we used a convenience sample of physicians from medical units, implying caution when generalizing results to other healthcare professionals. Also, our sample was relatively small, and future studies might want to explore PMIE exposure in larger samples of physicians. Second, we used an adapted version of the scale developed by Nash et al. (2013), but their instrument was validated in a non-Romanian, military sample. Future studies might use culturally-validated PMIE measurements or alternative scales validated on healthcare professionals (i.e. Mantri, Lawson, Wang, & Koenig, 2020). The questions we used to assess the pandemic's perceived physical and emotional impact, though covering a broader spectrum than other standard measurements, measured specific perceived individual states. This may also lower the generalizability and interpretation of the current results. Although there are advantages in using such general assessments, future studies might benefit from using more specific measures.

However, despite these limitations, to our knowledge, this is the first study to explore Covid-19 related PMIE exposure in a sample of Romanian physicians. Our results provide a valid starting point for identifying PMIE during the pandemic and other traumatic-related situations that burden healthcare staff. Second, there are several clinically and socially relevant implications emerging from the

present study. The general clinical relevance lies in the fact that, by exploring the prevalence and perceived intensity of PMIE exposure, we set the stage to describe the potential intervention strategies for preventing and treating subsequent MI following the current health crisis. In this regard, there are several guidelines provided by researchers and practitioners. For example, some of the most recommended practical psychological measures for both the prevention and treatment of pandemic-induced MI in healthcare are 1) promoting a safe and calm working environment; 2) nurturing hope; 3) fostering connectedness by showing support and being present for others; and 4) acknowledging the stress, pressure, and sacrifice of healthcare professionals (Roycoft, Wilkes, Pasttani, Fleming, & Olsson-Brown, 2020).

9. Conclusion

Healthcare systems, governments, and societies worldwide need to recognize that physicians are prone to experience PMIE and risk subsequent MI and PTSD due to their daily activity during the COVID-19 pandemic. Public policies need to actively offer and promote psychological support, to protect and help healthcare workers from the adverse outcomes following the subsequent Covid-19 MI. Examples of such actions might include free and on-request psychotherapy, public recognitions of physicians' and nurses' help during the pandemic. Other ways to build resilience at the system-level may include using organizational values to guide priorities and build partnerships between administrators and clinicians (Nagy, 2020).

Data availability statement (DAS)

The raw data supporting this article's conclusions are made freely available by the authors, at the following address: DOI 10.5281/zenodo.4274683.

Disclosure statement

The authors declare no financial interests/personal relationships, which may be considered as potential competing interests.

Funding

Ethics statement

The protocol of this study was designed in concordance with ethical requirements specific to the Faculty of Psychology and Educational Sciences, "Alexandru Ioan Cuza" University (Iasi, Romania) before beginning the study and supervised by Alexandra Maftei. All participants voluntarily participated in the study and gave written informed consent following the Declaration of Helsinki and the national laws from Romania regarding the ethical conduct in scientific research, technological development, and innovation. No animal studies are presented in this manuscript.

Author contribution

Both authors contributed equally to conceive and design the primary goal of the study, analyze the data, and write the manuscript.

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