



ARTICLE

<https://doi.org/10.1057/s41599-025-06322-5>

OPEN

 Check for updates

Progressive intensification of burnout among academic staff during the war

Natalia Tsibulyak¹✉, Uliana Kolomiets², Anastasiia Popova¹, Hanna Lopatina¹, Yuriy Petrushenko² & Yana Suchikova¹

This study examined the intensification of burnout among Ukrainian academic staff during the full-scale war, focusing on three core dimensions: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA). Data were collected across three waves (July 2022, January 2023, and January 2024) from 1493 participants using the Maslach Burnout Inventory (MBI). Findings reveal a significant increase in high EE levels from 49.5% in Wave 1 to 71.8% in Wave 3. High DP levels also grew substantially, from 32.9% to 59.4%. In contrast, low PA levels decreased from 22.0% to 13.0%, while high PA levels increased from 45.7% to 59.9%. Additionally, regression analysis showed that institutional relocation was associated with lower burnout, whereas migration status and sustained war-related stress were linked to higher levels of burnout dimensions. Findings underscore the cumulative impact of sustained crisis on occupational well-being. Additionally, the data suggest that across waves, burnout symptoms appeared more generalized at the population level. The results highlight the urgent need for targeted interventions to support the resilience of academic staff in conflict-affected environments. These findings contribute to the broader discourse on occupational burnout in crisis settings, offering insights relevant to other regions experiencing prolonged instability.

¹ Berdyansk State Pedagogical University, Berdyansk, Ukraine. ² Sumy State University, Sumy, Ukraine. ✉email: nata.tsibulyak@gmail.com

Introduction

Mental health and well-being are essential for professional effectiveness, educational resilience, and scientific progress (Singh et al., 2019). While often used interchangeably, these terms have distinct meanings. The World Health Organization (WHO) defines mental health as the ability to manage stress, fulfil potential, and contribute to society (WHO, 2022). War conditions create a unique psychological context characterized by continuous crisis and collective trauma (Eagle & Kaminer, 2013). Prolonged conflicts subject individuals to continuous traumatic stress, focusing on current and anticipated trauma rather than past events (Stevens et al., 2013). Repeated war stressors accumulate, intensifying psychological harm and increasing burnout vulnerability through the cumulative effects of trauma (Kira et al., 2013). Hobfoll's (1989) Conservation of Resources theory explains this by highlighting how resource depletion—such as loss of safety, stability, and social support—triggers further stress, leading to burnout. In academia, maintaining this balance is crucial. Teaching and research activities, though intellectually rewarding, are also psychologically demanding due to the heavy workload that combines instructional duties, administrative tasks, research obligations, and community engagement (Levy, 2025; Diener, 2018; Kunzler et al., 2020; Awang et al., 2021; Briggs, 2016; Winefield & Jarrett, 2001). Empirical studies from conflict zones reinforce this: teachers in the Syrian civil war (Sharifian et al., 2023), military personnel in Iraq and Afghanistan (Vinokur et al., 2011), and educators in conflict-affected Democratic Republic of Congo (Wolf et al., 2015) all exhibited elevated burnout levels. Such conditions often result in chronic stress, gradually impairing staff's ability to adapt, sustain productivity, and restore personal resources (Maslach & Leiter, 2016).

If left unaddressed, chronic stress may progress into burnout—a state characterized by three dimensions: emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA) (Maslach & Jackson, 1984; WHO, 2019). Notably, burnout affects approximately 37% of academic staff globally, one of the highest rates among professional groups (Guthrie et al., 2017). The primary causes of burnout include high-performance demands, work overload, strict deadlines, pressure to publish and maintain institutional prestige, as well as competition for grants and resources (Amer et al., 2022; Guthrie et al., 2017; Waaijer et al., 2018; Winefield et al., 2014). The lack of feedback and constructive leadership, combined with high performance expectations, creates an unfavourable environment that negatively affects well-being and motivation (Almeida-Souza & O'Brien, 2022; Kinman & Wray, 2020; Kolomitro et al., 2020). These challenges are compounded by frequent educational reforms, curriculum changes, and funding cuts (Shin & Jung, 2014; Watts & Robertson, 2011). Burnout intensifies during prolonged crises, as instability, increased workloads, and limited resources heighten the strain on academic staff (Levy, 2025; Papadeli et al., 2022; Pedditzi et al., 2020).

The COVID-19 pandemic exemplified this, rapidly transforming working conditions through the adoption of remote teaching (Mallhi et al., 2023; Marsh et al., 2022). This global stress test introduced challenges such as technostress, expanded roles, cognitive exhaustion, disrupted work-life balance, and heightened anxiety and depression among academic staff (Dinu et al., 2021; Husbands & Prescott, 2023; Rodríguez-De Avila & Paba-Argote, 2023). Taken together, these challenges underscore the systemic vulnerability of academia.

Prior to the full-scale war in 2022, Ukrainian academic staff were already grappling with typical challenges for academia. Chronic underfunding limited access to modern infrastructure and scientific resources, thereby constraining the quality of both

teaching and research (de Rassenfosse et al., 2023; Kyrylenko & Zhdan, 2023; Nepomnyashchyy et al., 2020). Low salaries, the necessity of juggling multiple positions, and ongoing educational reforms fostered a sense of instability and heightened stress levels (Bobrytska, 2022). Academic staff face an excessive workload, with 300–500 annual contact hours with students. Non-contact responsibilities further burden this—demands far exceeding those faced by European counterparts, who report burnout under significantly lighter conditions (Levy, 2025; Kyrian et al., 2020; Thielmann et al., 2022). At the same time, mental health issues among academic staff remained a low priority (Dziuba et al., 2021; Varnalij & Krasilnyk, 2017).

The full-scale war in Ukraine has fundamentally reshaped the academic sector, imposing unprecedented challenges on the higher education and science system, the functioning of educational institutions and the lives of academic staff (Lopatina et al., 2023). Educational losses include the migration of students abroad, exacerbating institutional competition and job insecurity (Bodnar, 2024). Universities in temporarily occupied territories and areas of active hostilities have suffered considerable losses, including the destruction of infrastructure, loss of access to material and technical resources, and the forced suspension of operations (Tsybuliak et al., 2023). However, relocation has brought about serious challenges, such as limited resources, the need for faculty and students to adapt to new conditions, and the reestablishment in new locations (Tsybuliak et al., 2024; Orzheh et al., 2023; Zozulak & Bashuryn, 2023). The campuses of many universities have been damaged or severely affected (UNESCO, 2024). Relatively safe regions have become key hubs for the relocation of universities from dangerous territories, supporting relocated institutions and internally migrants (Bezzubko & Ponomarova, 2023).

Approximately 13.5% of academic staff became internally or externally migrants, with many facing the loss of stable professional environments, limited access to resources, and disrupted social connections (Lavrysh et al., 2022; UNESCO, 2024). Those who remained in their localities confronted numerous challenges. In areas of active hostilities, academic staff were under constant threat of shelling and instability (Velykodna et al., 2023). In occupied territories, restrictions on academic freedom, fear of persecution, and the loss of professional networks exacerbated feelings of isolation and reduced professional accomplishment (Nenko et al., 2023; Suchikova et al., 2024). Additionally, 1.7% of academic staff were mobilized for military service, with some tragically losing their lives in the conflict (UNESCO, 2024). Some of them became active volunteers, participating in humanitarian aid efforts, supporting internally displaced persons, or assisting Ukraine's Armed Forces (Costas et al., 2024). While these contributions are essential to Ukraine's resilience, they placed additional burdens on academic staff (Blyznyuk & Sobakar, 2024).

The reliance on remote or hybrid teaching formats due to constant bombing, the impossibility and difficulty of creating safe living conditions on the campuses, and the dispersion of both staff and students throughout Ukraine and the world has intensified technostress (Severyn & Severyn, 2023). These efforts are further hindered by frequent power outages and communication disruptions caused by shelling, forcing the reorganization of teaching and research under constrained resources (Sytnykova et al., 2024; Lopatina et al., 2023).

Moreover, constant danger, missile attacks, and personal losses significantly deteriorated the mental health and well-being (Kurapov et al., 2022). High levels of anxiety persisted throughout the conflict due to fears for personal safety, uncertainty about the future, and exposure to ongoing traumatic events such as shelling (Kalcza-Janosi et al., 2023; Kurapov et al., 2022). Burnout

was especially acute among those who had experienced family losses or were forced to migrate due to military actions (Kurapov et al., 2022).

Despite these pressures, Ukraine's higher education and science system has demonstrated remarkable adaptability, even under the difficult circumstances of war. Universities have continued to deliver educational programs despite limited resources, power outages, and constant threats to safety (Nazarovets, 2024; Nikolaev et al., 2023). At the same time, chronic stress, excessive demands, and the need to adapt to extreme circumstances threaten the resilience of the educational system and the preservation of scientific potential. If unaddressed, this problem could lead to a significant portion of academic staff leaving the profession, further destabilizing the sector and deepening the loss of intellectual resources (Tsybuliak et al., 2024).

In this context, reforms in the fields of education and science are expected to play a pivotal role in supporting academic staff and creating the conditions necessary for system resilience. The Law "On Supporting Scientific Work in Higher Education Institutions" aims to align Ukraine's higher education with European standards by reducing teaching workloads (Official Portal of the Verkhovna Rada of Ukraine, 2024). In addition, the Ministry of Education and Science plans to consolidate state universities, reducing their number from 170 to 100 through mergers and restructuring (The Ukrainians, 2023). However, these reforms without additional funding and personnel they may increase workload disparities and administrative burdens (Xia et al., 2019).

Despite growing awareness of burnout in academia, empirical research on its progression during prolonged armed conflicts remains scarce. Most existing studies focus on stress and burnout in stable or post-crisis settings, offering limited insights into how burnout evolves under sustained wartime conditions. This gap is particularly pronounced in the context of higher education systems affected by displacement, institutional instability, and insecurity. Therefore, this study aims to investigate burnout dynamics among Ukrainian academic staff during the ongoing conflict. We hypothesize that burnout levels among academic staff are higher in later waves than in earlier ones during the full-scale war in Ukraine and that factors such as institutional relocation, migration status and war-related stressors serve as risk factors. By understanding these patterns, the research seeks to contribute to the global discourse on mental health in academia during crises and to provide actionable insights for interventions supporting mental health in similarly challenging contexts.

Methods

This study employed a repeated cross-sectional analytical design to examine burnout among Ukrainian academic staff during the full-scale war. We collected three independent cross-sections. Participants were not re-identified or followed across waves; therefore, changes over time reflect population-level differences between samples rather than within-person change. Because recruitment was voluntary and online via institutional networks, the samples are non-probability and not intended to be statistically representative; inferences therefore concern between-period population differences rather than within-person change.

Academic staff were identified primarily through institutional networks. Survey invitations were sent via official university email lists provided by administrative offices, supplemented by distribution through professional associations, academic unions, and researcher mailing lists. The sampling approach was intended to capture diversity across regions, institutional types, and disciplines. No institutions were deliberately excluded, although participation depended on institutional willingness to circulate the invitation. Recruitment relied on voluntary response.

Data were collected through an online survey distributed via email using Google Forms. To ensure clarity and feasibility, a preliminary version of the survey was tested on a group of 15 academic staff members. This pilot confirmed that the questions were clear.

Data were collected in a repeated cross-sectional design across three waves:

- Wave 1: July 2022, five months after the full-scale war began.
- Wave 2: January 2023, 11 months after the onset of the war.
- Wave 3: January 2024, 23 months after the full-scale war began.

Participation was voluntary and anonymous, ensuring the confidentiality of responses. Before beginning the survey, participants were informed of the study's goals and provided consent. Although the survey invitation was widely distributed, the number of individuals who viewed it could not be assessed, precluding calculation of the study's response rate.

Measures. The study utilized a self-administered online survey, designed to be completed in ~10–12 min. The survey consisted of two primary sections: sociodemographic characteristics (burnout predictors) and burnout measurements. The first section gathered detailed sociodemographic and war-related information to provide a comprehensive understanding of the participants' backgrounds. Sociodemographic data included gender (man, woman, or prefer not to mention), age (reported in years), scientific degree (Doctor of Science, PhD, or Magister degree), and professional role (Professor, Associate Professor, Senior Lecturer, or Assistant). War-related predictors focused on migration status, with participants identifying as external migrants (relocated outside Ukraine), internal migrants (moved within Ukraine), or those remaining in their permanent location. Additionally, participants provided information about their institution's status, indicating whether it remained in its permanent location or had been temporarily relocated to a Ukraine-controlled territory due to the war. Universities in their permanent locations continued to operate from their original campuses despite the challenges posed by the war. In contrast, temporarily relocated universities moved their operations to safer regions under Ukrainian control, often due to occupation by Russian troops of their original location or damage to infrastructure. This relocation typically involved setting up operations in new cities or regions to ensure the continuation of academic activities.

The second section of the survey incorporated the Maslach Burnout Inventory-Human Services Study (MBI-HSS) (Maslach & Leiter, 2016). This widely validated instrument measures three core dimensions of burnout: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA). The MBI-HSS comprises 22 items, with nine items assessing EE (e.g., "I feel emotionally drained from my work"), five items measuring DP (e.g., "I feel I treat some recipients as if they were impersonal objects"), and eight items evaluating PA (e.g., "I deal effectively with the problems of my recipients"). Participants responded to each item on a seven-point Likert scale ranging from 0 (never) to 6 (every day). Scores for each dimension were calculated by summing the relevant item responses, following standardized scoring procedures. Higher scores on EE and DP indicated greater levels of burnout, while higher scores on PA indicated lower burnout (greater personal accomplishment). A pilot test was conducted during the preliminary phase of the study to confirm the instrument's clarity and alignment with the constructs it aimed to measure. Ethical considerations included informed consent, confidentiality, and voluntary participation.

To further examine the internal consistency of the MBI-HSS across the three waves, Cronbach's alpha was calculated for each subscale and the overall scale. The results demonstrated good reliability overall ($\alpha = 0.83$). When disaggregated by wave, internal consistency ranged from acceptable to excellent: Wave 1 ($\alpha = 0.78$), Wave 2 ($\alpha = 0.79$), and Wave 3 ($\alpha = 0.88$). These values suggest that the burnout dimensions coherently measure a unidimensional construct, particularly as the war progressed. Factor analysis supported this, revealing that all three components loaded strongly on a single latent factor across all waves, with increasing coherence over time. Detailed reliability and factor structure results are presented in the Supplementary Materials (see Supplementary Tables 1–2).

Sample and operational definitions. Eligible participants were academic staff employed at Ukrainian higher education institutions during the full-scale war. Exclusion criteria included incomplete surveys and pilot data. Participants were asked to self-identify their migration status as one of the following:

- Non-migrants: individuals who remained in their original place of residence during the war.
- Migrants: individuals who relocated either within Ukraine (internal migration) or abroad (external migration) for six months or more due to the war. The six-month threshold aligns with international standards for defining long-term displacement in conflict settings.

In addition, participants reported their university's operational status:

- No (Permanently located): universities that continued operations from their original, pre-war campuses.
- Yes (Temporarily relocated): universities that moved operations to Ukrainian-controlled territories due to occupation by Russian forces or substantial infrastructure damage.

Because of the full-scale war, the samples were voluntary, online, non-probability cohorts and thus are not designed to be statistically representative of all Ukrainian academic staff. For scale, the wave Ns (Wave 1: 836; Wave 2: 228; Wave 3: 429) each constitute <1% of the national higher-education workforce in the respective years (≈ 104 –111k) (State Statistics Service of Ukraine, 2025). We sought broad coverage across regions, institution types, and war-related exposures and verified between-wave comparability on age, gender, degree status, migration, and university relocation (Table 1). All models adjust for these covariates. National generalisability should be interpreted with caution; results are most reliable for trend comparisons across waves within this design.

Statistical analysis. The data collected through standardized surveys was downloaded and processed for analysis using STATA® software. Prior to analysis, the dataset underwent logical control to ensure consistency and reliability of responses. The data consisted of responses from 1,493 observations across three waves.

Cronbach's alpha was calculated for EE, DP, and reversed PA subscales across all waves (see Supplementary Materials, Supplementary Table 1). Reliability was good to excellent (overall $\alpha = 0.83$; Wave 1 $\alpha = 0.78$; Wave 2 $\alpha = 0.79$; Wave 3 $\alpha = 0.88$). An EFA of all 22 items ($N = 1493$) replicated the canonical three-factor solution (EE/DP/PA), accounting for 81.8% of the variance. At the subscale level, EE, DP, and PA (reversed) loaded strongly on a higher-order burnout factor in each wave, most pronounced

in Wave 3 (EE = 0.842; DP = 0.884; PA = 0.767), suggesting increasing coherence of the latent construct over time.

To evaluate the latent structure of the MBI-HSS, we conducted exploratory factor analysis (EFA) using principal-component extraction and oblique promax rotation. This approach is appropriate when factors are expected to correlate. The analysis retained three factors, consistent with the theoretical subscales (EE, DP, PA), which together explained 81.8% of the total variance. Model fit was supported by a likelihood ratio test comparing the saturated and independence models ($\chi^2(231) = 17,000, p < 0.001$) (see Supplementary Materials, Supplementary Tables 2–5).

To assess the effects of sociodemographic and war-related predictors on burnout over time, we applied fixed-effects (FE) linear regression models. Model equations, STATA syntax, and diagnostics (including Hausman test outputs) are provided in Supplementary Materials (see Supplementary Materials, Supplementary Tables 6–8). Hausman tests supported the use of fixed-effects over random-effects models across all burnout dimensions ($p < 0.001$), indicating correlation between regressors and unobserved effects. While warnings regarding the rank of the differenced variance matrix and non-positive definiteness were observed, these are common in unbalanced panel datasets or in the presence of multicollinearity. The FE estimator remains consistent and was retained as the preferred specification. In this repeated cross-sectional context, the FE/time-dummy term absorbs wave-specific differences but does not identify individual trajectories; estimates may still reflect between-wave compositional differences. We therefore interpret wave contrasts as population-level associations, not within-person change.

Descriptive statistics were calculated to explore the distribution of burnout levels across three dimensions (EE, DP, and PA). This included computing means, medians, standard deviations, and percentile ranges for each burnout predictor and category (low, moderate, high). The Mann-Whitney U test (Wilcoxon rank-sum test) was employed to assess significant differences in burnout levels across the three waves, given the unequal group sizes. This non-parametric test was used to compare EE, DP, and PA changes. Fixed-effects regression analysis was applied to identify the effect of the waves on burnout. In addition, the FE model and OLS were used to identify significant burnout predictors. Independent burnout predictors included age, gender, scientific degree, migration status, and changing university location.

Results

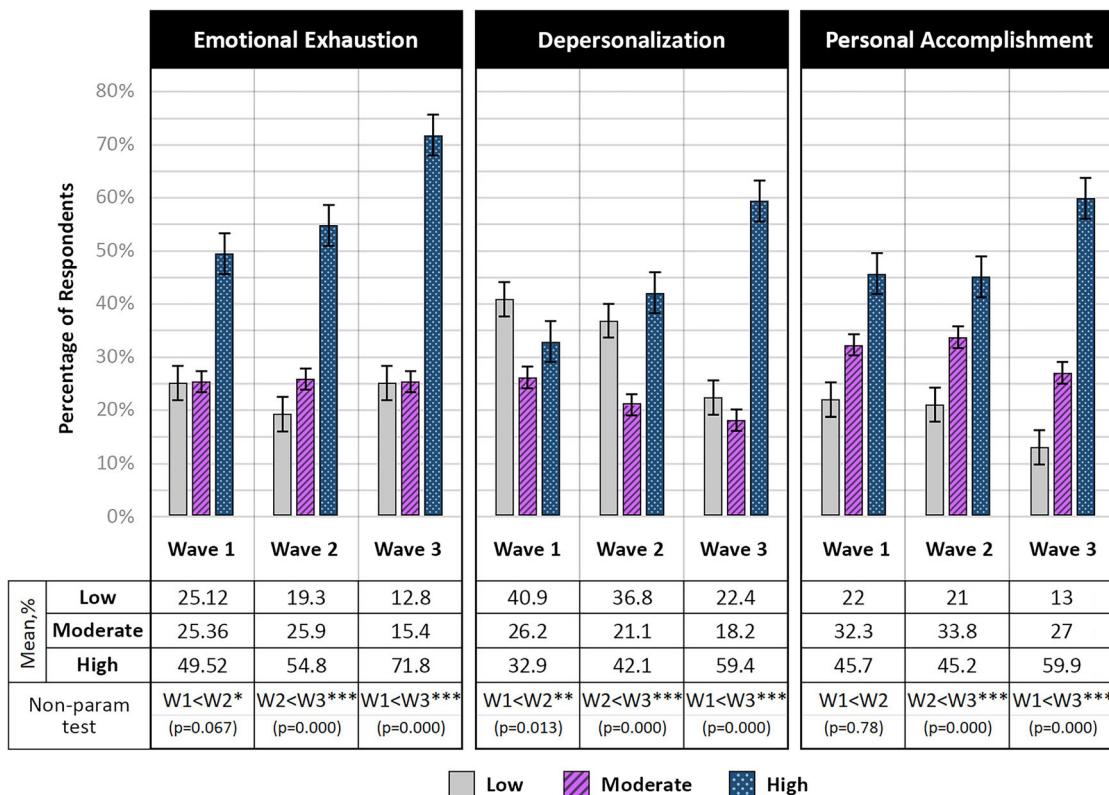
This section presents the findings of the investigation into the dynamics of burnout among Ukrainian academic staff during the ongoing war, focusing on three key dimensions: EE, DP, and PA. The results are described in a logical progression, beginning with the overall dynamics of burnout across three waves, followed by detailed regression analyses for each burnout dimension, and concluding with a comparative analysis of burnout predictors across all burnout dimensions. Because the design is repeated cross-sectional, between-wave differences represent population-level changes rather than within-person trajectories.

Dynamics of burnout across three waves among academic staff. Figure 1 illustrates the distribution of low, moderate, and high levels of burnout, capturing the between-wave patterns in burnout dimensions. Across waves, we observed higher EE and DP and shifts in PA. For EE, the proportion with high EE levels rose markedly from 49.5% in Wave 1 to 71.8% in Wave 3, while the percentage with low EE levels fell from 25.1% to 12.8%. The mean EE scores mirrored this upward trend (see Supplementary

Table 1 Sociodemographic characteristics of evaluated Ukrainian academic staff.

Predictors	Subcategory	Wave 1		Wave 2		Wave 3	
		Name	Distribution, % (N)	Mean [SD]	Distribution, % (N)	Mean [SD]	Distribution, % (N)
Age	Under 35	15.2% (127)	2.31 [0.03]	15.35% (35)	2.39 [0.05]	17.02% (73)	2.39 [0.04]
	35-45 years	45.3% (379)		36.84% (84)		35.43% (152)	
	46-60 years	32.9% (275)		41.67% (95)		38.93% (167)	
	61 older	6.6% (55)		6.14% (14)		8.62% (37)	
Gender	Men	20.45% (171)	0.79 [0.01]	13.6% (31)	0.86 [0.02]	25.41% (109)	0.74 [0.02]
	Women	79.55% (665)		86.4% (197)		74.59% (320)	
Scientific Degree	PhD Students	17.7% (148)	2.83 [0.03]	14.91% (34)	2.88 [0.05]	19.35% (83)	2.83 [0.04]
	PhD	64.11% (536)		66.67% (152)		63.64% (273)	
	Doctor of Science	18.18% (152)		18.42% (42)		17.02% (73)	
Migration status	No	62.92% (526)	0.37 [0.02]	67.54% (154)	0.33 [0.03]	55.48% (238)	0.44 [0.02]
	Yes	37.08% (310)		32.46% (74)		44.52% (191)	
University relocation	No	78.83% (659)	0.21 [0.01]	77.19% (176)	0.23 [0.03]	62.94% (270)	0.37 [0.02]
	Yes	21.17% (177)		22.81% (52)		37.06% (159)	
TOTAL, N		836		228			429

(N)—number of respondents, indicated in parentheses; [SD]—standard deviation, indicated in square brackets.

**Fig. 1** Distribution of respondents (%) across three waves (W1-W3) by levels of Emotional Exhaustion, Depersonalization, and Personal Accomplishment (low, moderate, high).

Emotional Exhaustion. The bar graph presents the percentage of academic staff falling into each level of the three burnout dimensions as measured by the Maslach Burnout Inventory. Error bars represent standard errors. Below the graph, mean values and results of non-parametric Mann-Whitney U tests are provided to indicate the statistical significance of changes across waves. Statistically significant increases in high burnout levels and corresponding decreases in low burnout levels over time are observed, particularly in EE and DP. Percentage of respondents by wave and levels of burnout dimensions, including means (%) and statistical significance of differences between waves based on the Mann-Whitney U test.

Materials, Supplementary Tables 9). Statistical analysis confirmed that the difference between-wave differences Wave 1 and Wave 2 was significant, and the differences between Wave 2 and Wave 3 and between Wave 1 and Wave 3 were highly significant, underscoring a consistent increase across waves in EE.

Depersonalization. Similarly, the percentage of respondents reporting high levels of DP increased from 32.9% in Wave 1 to 59.4% in Wave 3, while those with low DP declined from 40.9% to 22.4%. The mean DP score also rose over time (see Supplementary Materials, Supplementary Tables 9–10), with statistical tests confirming

Table 2 Emotional exhaustion among Ukrainian academic staff across waves and levels.

Predictors	General, FE model	Levels of EE									
		Wave 1			Wave 2			Wave 3			
		Low (1)	Moderate (2)	High (4)	Low (5)	Moderate (6)	High (7)	Low (8)	Moderate (9)	High (10)	
Age	-2.349* (0.646)	-0.284 (0.700)	0.108 (0.337)	-1.200 (0.811)	0.939 (1.170)	0.118 (0.691)	0.531 (1.375)	-0.966 (1.317)	0.412 (0.603)	-0.705 (0.909)	
Gender	7.000* (1.282)	3.539* (1.285)	0.776 (0.690)	0.814 (1.756)	2.503 (2.283)	0.732 (1.926)	2.629 (3.285)	-1.283 (2.802)	-0.895 (1.130)	-5.286* (1.735)	
Women											
Scientific degree	1.387** (0.590)	0.523 (0.646)	0.149 (0.315)	0.277 (0.643)	-1.172 (1.117)	-0.210 (0.685)	0.733 (1.329)	0.821 (1.187)	0.331 (0.606)	1.985** (0.934)	
University relocation	-6.951* (1.354)	-0.176 (1.479)	0.0274 (0.719)	0.509 (1.598)	1.144 (3.651)	-0.540 (1.576)	1.547 (2.912)	-1.720 (3.106)	-2.106 (1.333)	-7.372* (2.012)	
Migration status	2.426** (1.211)	0.980 (1.358)	-0.143 (0.652)	-1.669 (1.217)	-3.565 (3.532)	-1.391 (1.393)	-4.614*** (2.518)	-2.831 (3.193)	3.848* (1.354)	5.523* (1.905)	
Cons	49.48* (2.329)	18.87* (2.643)	40.85* (1.198)	67.01* (2.766)	24.38* (4.375)	42.68* (2.895)	60.68* (5.497)	27.82* (4.815)	39.42* (2.282)	71.63* (3.279)	
ρ	0.120	-	-	-	-	-	-	-	-	-	
N	1493	210	212	414	44	59	125	55	66	308	

The dependent variable – EE—is in the percent.

Model: reg emot_Age Women Degree Univ_Reloc_Yes Migr_stat_Yes.

cons—The constant term in the regression model, representing the baseline level of the dependent variable (EE, DP, or PA) when all dimensions are zero.

ρ —Proportion of variance in the dependent variable explained by stable, unobserved individual traits (e.g., personality or resilience). Higher ρ indicates a greater influence of intrinsic factors, while lower ρ suggests external factors dominate.

Note: Standard errors in parentheses.

*** $p < 0.10$, ** $p < 0.05$, * $p < 0.01$.

significant increases across all waves ($W_1 < W_2$, $W_2 < W_3$, $W_1 < W_3$).

In contrast, low Personal Accomplishment (PA) levels decreased from 22.0% in Wave 1 to 13.0% in Wave 3, while high PA increased from 45.7% to 59.9%. However, mean PA scores declined, indicating a nuanced shift in perceived personal accomplishment (see Supplementary Materials, Supplementary Table 9). Statistical analysis showed no significant change in PA between Wave 1 and Wave 2, but significant declines were detected between Wave 2 and Wave 3 and between Wave 1 and Wave 3, suggesting that devaluation of professional accomplishment was more pronounced in later waves (see Supplementary Materials, Supplementary Tables 10).

Emotional exhaustion among academic staff. Table 2 presents the socio-demographic predictors associated with EE among Ukrainian academic staff across levels and three waves (see also Supplementary Materials, Supplementary Table 11 for additional regression results).

The findings reveal that age was associated with lower high EE in Wave 1, which appeared to weaken by Wave 3. However, age did not significantly influence low or moderate EE levels, suggesting its selective impact on severe burnout cases. Gender consistently demonstrated an association with EE. In Wave 1, women reported higher levels of low EE, but by Wave 3, they exhibited significantly lower levels of high EE compared to men, indicating a between-wave pattern in gender differences (rather than within-person adaptation).

Academic qualifications showed a growing association with high EE, becoming statistically significant in Wave 3. Meanwhile, university relocation was associated with lower high EE in Wave 3, where it significantly reduced high EE levels. Migration status initially showed no significant effect but was strongly associated with moderate and high EE levels by Wave 3, a pattern consistent with cumulative stressors linked to displacement (causal inference is not possible).

The ρ values provide critical insights into the sources of variation in EE. For the general level of EE, $\rho = 0.12$, which may reflect stable, unobserved factors, such as personality traits or resilience, which remain constant across the three waves. At lower levels of EE, the influence of these intrinsic factors may be minimal, suggesting that external, situational conditions may dominate. However, as burnout intensifies, the role of unobserved traits becomes more pronounced, with ρ rising to 8.6% for high EE. This shift highlights that at higher levels of burnout, individual characteristics like emotional stability or the capacity to adapt to stress may play a more significant role in determining outcomes.

Depersonalization among academic staff. The data in Table 3 identify several significant predictors associated with depersonalization among Ukrainian academic staff across waves, offering insights into between-wave differences during the ongoing war (see also Supplementary Materials, Supplementary Tables 12 for additional regression results).

Age showed inconsistent effects on DP among academic staff across waves. In Wave 1, age was negatively associated with high DP, indicating that older individuals initially experienced lower levels of DP, indicating that older individuals had lower levels of DP in Wave 1. However, this association became insignificant by Wave 3. Gender (Women) had no significant impact on depersonalization in the earlier waves but became strongly negatively associated with high DP in Wave 3. Holding a scientific degree was significantly associated with high DP in Wave 3. The association of university relocation with DP varied across waves: in Wave 1, relocation was associated with lower DP at low levels, while in Wave 3, it was associated with lower high DP levels. Migration status initially showed mixed effects on DP but was significantly associated with higher DP at high levels in Wave 3.

The ρ values highlight the influence of unobserved individual characteristics on DP across levels. At the general level, approximately 14.6% of the variance in DP may reflect stable

Table 3 Depersonalization among Ukrainian academic staff across waves and levels.

Predictors	General, FE model	Levels of DP									
		Wave 1			Wave 2			Wave 3			
		Low (1) (2)	Moderate (3)	High (4)	Low (5)	Moderate (6)	High (7)	Low (8)	Moderate (9)	High (10)	
Age	-2.819* (0.640)	0.114 (0.376)	-0.264 (0.311)	-1.682 (1.036)	-0.0658 (0.707)	-0.326 (0.816)	-0.712 (1.616)	0.0626 (0.651)	-0.636 (0.535)	-0.0792 (1.169)	
Gender Women	-1.971 (1.269)	0.842 (0.722)	-0.122 (0.650)	-2.413 (1.930)	0.0693 (1.926)	-0.531 (1.656)	1.185 (3.273)	-0.334 (1.326)	1.459 (1.135)	-11.11* (2.165)	
Scientific degree	1.013*** (0.584)	0.227 (0.340)	0.309 (0.295)	0.0821 (0.785)	0.871 (0.638)	-1.114 (0.808)	0.402 (1.601)	1.177*** (0.604)	0.262 (0.480)	1.426 (1.217)	
University relocation	-7.359* (1.340)	-2.414* (0.745)	-0.477 (0.682)	0.115 (2.106)	-2.136 (1.598)	1.373 (1.781)	5.899 (3.619)	-3.784** (1.575)	2.685** (1.198)	-4.294 (2.610)	
Migration status	0.588 (1.198)	-0.332 (0.683)	-0.841 (0.553)	-1.080 (1.618)	0.406 (1.459)	-0.217 (1.673)	-3.002 (3.116)	0.590 (1.612)	-2.899** (1.194)	4.107*** (2.398)	
Cons	36.63* (2.305)	7.394* (1.401)	24.34* (1.161)	52.48* (3.214)	7.282** (3.192)	29.30* (2.472)	46.05* (6.316)	7.052* (2.352)	25.92* (2.011)	58.68* (4.243)	
ρ	0.146	-	-	-	-	-	-	-	-	-	
N	1493	342	219	275	84	48	96	96	78	255	

The dependent variable - DP - is in the percent.

Model: reg emot_Age Women Degree Univ_Reloc_Yes Migr_stat_Yes.

Note: Standard errors in parentheses.

*** $p < 0.10$, ** $p < 0.05$, * $p < 0.01$.

Table 4 Personal accomplishment among Ukrainian academic staff across waves and levels.

Predictors	General, FE model	Levels of PA									
		Wave 1			Wave 2			Wave 3			
		Low (1) (2)	Moderate (3)	High (4)	Low (5)	Moderate (6)	High (7)	Low (8)	Moderate (9)	High (10)	
Age	1.239* (0.469)	0.339 (0.415)	0.235 (0.281)	0.802 (0.608)	1.382*** (0.710)	0.365 (0.473)	-1.618 (1.209)	0.319 (0.827)	-0.0534 (0.358)	0.277 (0.959)	
Gender Women	1.094 (0.931)	-1.281 (0.830)	-1.015*** (0.550)	-0.864 (1.170)	-0.868 (1.789)	1.363 (1.373)	3.313 (2.336)	-2.926 (1.757)	-0.628 (0.798)	7.102* (1.708)	
Scientific degree	0.0488 (0.429)	0.472 (0.413)	0.0877 (0.244)	0.224 (0.497)	-0.601 (0.798)	-1.031** (0.405)	-0.638 (1.150)	-0.309 (0.671)	0.208 (0.361)	-0.349 (0.972)	
University relocation	3.586* (0.983)	0.976 (0.996)	-0.0491 (0.518)	-1.162 (1.264)	-0.286 (1.650)	-1.906*** (1.119)	2.321 (2.641)	1.645 (2.355)	0.429 (0.785)	2.817 (2.039)	
Migration status	-2.013** (0.879)	-0.702 (0.885)	0.604 (0.455)	0.784 (1.001)	0.438 (1.690)	-1.025 (0.974)	3.833*** (2.194)	0.367 (2.370)	0.317 (0.780)	-3.618*** (1.938)	
Cons	64.90* (1.691)	87.37* (1.594)	75.03* (0.995)	57.27* (2.038)	87.00* (3.344)	77.22* (1.838)	59.06* (4.315)	91.13* (3.050)	75.02* (1.326)	50.55* (3.382)	
ρ	0.0572	-	-	-	-	-	-	-	-	-	
N	1493	184	270	382	48	77	103	56	116	257	

The dependent variable - PA - is in the percent.

Model: reg emot_Age Women Degree Univ_Reloc_Yes Migr_stat_Yes.

Note: Standard errors in parentheses.

*** $p < 0.10$, ** $p < 0.05$, * $p < 0.01$.

traits such as personality or resilience. In contrast, low DP levels suggest minimal influence from these factors, suggesting a greater role for external, time-varying factors. The role of individual traits appears to increase for moderate and high DP levels.

Devaluation of personal accomplishment among academic staff. Table 4 presents the socio-demographic predictors associated with PA among Ukrainian academic staff across levels and three waves (between-wave differences) (see also Supplementary Materials, Supplementary Tables 13 for additional regression results).

Age was positively associated with low PA in Wave 2, a wave-specific association. However, its effects fluctuated across other

levels and waves, indicating context-dependent impacts. Gender (Women) had no consistent impact on PA across waves but showed a significant positive association with high PA in Wave 3. A scientific degree had minimal association on PA, with no significant associations across most waves and burnout levels, except for a negative association with moderate PA in Wave 2, reflecting temporary professional strain. The association of university relocation with PA varied across waves; in Wave 3 it was associated with higher high PA. Migration status had mixed effects, being positively associated with high PA in Wave 2 but negatively associated in Wave 3, highlighting the complex and context-dependent impact of migration on burnout dynamics.

The ρ values indicate that unobserved individual traits accounted for 5.7% of the variance in general PA levels and only 1% to 4% across low, moderate, and high PA levels. These findings are consistent with external factors playing a dominant role in the devaluation of PA.

Comparison of burnout dimensions and social-demographic predictors. A comparison of regression results for EE, DP, and decreased PA highlights key differences in how age, gender, scientific degree, university relocation, and migration experiences influence these three burnout dimensions across waves. Age showed a more pronounced association with PA than in EE or DP, particularly in Wave 2, where older individuals reported higher low-PA. In contrast, age was occasionally associated with lower high EE, but its association with DP was weak and inconsistent. Gender had a pronounced and context-dependent impact on both EE and PA. Women consistently reported higher EE, consistent with higher reported exhaustion, but demonstrated lower PA devaluation in Wave 1 and higher PA devaluation in Wave 3. Gender's effect on DP was limited, becoming significant only in Wave 3, where women reported lower high DP levels.

A scientific degree had a more pronounced impact on PA, at times associated with less PA devaluation, particularly at moderate levels in Wave 2, but showed limited associations with EE or DP. University relocation associated with lower PA devaluation, especially in Wave 2, but its associations with EE and DP were variable. Migration status showed the strongest association with PA, with positive associations at high PA in Wave 2 and negative associations in Wave 3, a pattern that may reflect adaptation across waves. Its associations with EE and DP were less consistent, though a significant association was observed for high EE by Wave 3.

The constant terms across the models are consistently significant and positive, with the highest values in PA, consistent with PA devaluation being more prevalent at baseline during crises, while EE and DP appearing more situationally variable. Interestingly, the ρ values indicate distinct patterns: EE appears to reflect a mix of intrinsic and external factors, with intrinsic traits becoming more salient as burnout intensifies; DP shows greater reliance on individual traits, particularly at high levels; and PA is predominantly associated with external factors, with intrinsic traits more salient in severe cases.

Discussion

This study provides significant insights into the mental health challenges faced by academic staff in war-affected regions, with a particular focus on burnout. Across three independent cross-sections, burnout dimensions exhibited between-wave differences: EE and DP increased, while PA declined. These findings reflect the compounded impact of prolonged stress during wartime, such as displacement, institutional instability, and personal loss, on human behaviour. Similar patterns have been identified in prior research emphasizing the role of chronic stress in exacerbating EE and lowering PA (Levy, 2025; Ansley et al., 2021; Fynn & van der Walt, 2023; Kushnir & Melamed, 1992; Morgan et al., 2002). It is important to note that the study employed a repeated cross-sectional design, with different participants in each wave. Consequently, the regression models with wave indicators estimate differences at the population level between survey periods rather than tracking within-individual change. Observed temporal patterns should therefore be interpreted with caution, as they may partly reflect variations in sample composition across waves. For explanatory sections below, we present interpretive mechanisms as hypotheses consistent with the observed associations rather than causal claims.

A notable observation is the apparent convergence of EE, DP, and diminished PA in Wave 3 (after two years of the full-scale war in Ukraine), which we interpret as a between-wave pattern suggesting a shift from acute stress responses to a more generalized and undifferentiated state of burnout. The internal consistency of the burnout dimensions increased across waves, with the highest Cronbach's alpha observed in Wave 3. This indicates that, as the war progressed, burnout appeared to become a more unified psychological experience, with EE, DP, and PA increasingly intertwined. This pattern was also supported by factor analysis, which revealed stronger loadings on a single latent burnout construct across waves. Such convergence may reflect a behavioral adaptation to prolonged stress, often manifested as emotional numbing, where individuals detach emotionally to preserve functional capacity. While this response may temporarily protect against overwhelming stress, it typically diminishes professional engagement, as seen in other academic and occupational settings during crises (Gómez-Domínguez et al., 2022; Cordes & Dougherty, 1993; Halbesleben et al., 2004; McManus et al., 2002) and in conflict/disaster contexts (Sharifian et al., 2023; Vinokur et al., 2011; Wolf et al., 2015). Furthermore, repeated exposure to uncontrollable stressors, such as missile attacks and forced displacement, may have contributed to a sense of helplessness – an experience closely associated with reduced emotional reactivity and motivation. This is consistent with foundational research on learned helplessness, which suggests that persistent adversity undermines individuals' sense of control and exacerbates burnout (Abramson et al., 1978; Dalla et al., 2008; Maier & Watkins, 2005; Seligman, 1972).

Notably, by the third wave, a strengthened collective identity among academic staff may have served as a stabilizing force. The shared commitment to sustaining Ukraine's higher education system likely mitigated some of the adverse impacts of stress. This aligns with findings that emphasize the buffering role of social identity in high-stress environments (Haslam et al., 2005). Similarly, shared purpose and group solidarity enhance individuals' resilience by providing a sense of belonging and meaning (Ashforth & Mael, 1989).

The findings also reveal nuanced dynamics of burnout among Ukrainian academic staff, highlighting how social-demographic factors were associated with EE, DP, and PA across waves. Younger staff exhibited higher EE during the early waves, consistent with their vulnerability due to fewer professional resources and limited resilience in coping with the compounded stress of war. This aligns with findings that younger professionals often face heightened occupational stress due to less experience and professional networks (Kim & Stoner, 2008; Ng & Feldman, 2010).

By Wave 3, women reported lower EE compared to men, a between-wave difference that we hypothesize may relate to greater reliance on emotion-focused coping strategies and the activation of robust social support networks, often amplified in collectivist or crisis contexts. In high-stress environments such as war, these behaviours can serve as protective mechanisms against burnout (Matud, 2004). Additionally, studies of university staff during crises confirm that gender differences in burnout patterns are shaped by variations in coping styles and the availability of institutional and interpersonal support (Popa-Velea et al., 2017; Watts & Robertson, 2011).

These findings, while important, only partially explain the late decline in between-wave differences in emotional exhaustion among women academic staff. To deepen this analysis, it is essential to consider gender-specific responsibilities and social roles in the Ukrainian context. Women have traditionally borne a disproportionate share of caregiving, household management, and emotional labour—roles that intensified during wartime due

to family displacement, childcare demands, and community mobilisation. These added pressures may have been associated with sustained or heightened emotional exhaustion initially, delaying any observed adaptation.

Cultural factors also played a role. Women-dominated social networks and community-based coping mechanisms, while supportive, may have simultaneously reinforced expectations of emotional labour, thereby intensifying initial burnout symptoms. This interpretation aligns with findings by Kim et al. (2024), who reported that gendered caregiving roles and cultural expectations significantly influenced the pattern of burnout among women professionals in crisis settings. Again, we frame these cultural explanations as hypotheses. As such, gender differences in burnout across waves cannot be fully understood without acknowledging both structural inequalities and culturally embedded roles.

Institutional relocation was associated with lower EE and DP in later waves, especially as working environments stabilized and access to resources improved. Initial relocation challenges (absence of campus, limited resources) complicate causal interpretation; our findings indicate associations rather than effects. This aligns with findings emphasizing the role of organizational resilience in fostering recovery and adaptation during crises (Duchek, 2020). Similarly, studies highlight the importance of strategic vision and supportive cultures in higher education institutions to ensure resilience during wartime (Agapova et al., 2024; Hurenko et al., 2024; Tsybuliak et al., 2023). Furthermore, resilience has been shown to mediate the association between organizational support and burnout, with institutions that prioritize leadership development and resource allocation reporting lower burnout rates (Luo et al., 2022; Petrushenko et al., 2023).

DP increased steadily across waves, but age was initially associated with lower high DP (Wave 1), reflecting greater accumulated psychological resources. Over time, this protective association diminished as stress persisted, consistent with findings that prolonged exposure erodes coping capacities (McEwen & Stellar, 1993). Gender-specific associations of migration indicated that women staff with refugee experiences reported lower DP levels than men, highlighting the buffering role of communal identity and social networks. Social connectedness, particularly in gendered and community-driven networks, has been shown to mitigate stress and promote resilience (Kim et al., 2024). Relatedly, research has emphasized that communal orientation and equitable social exchanges are key factors in preventing DP, especially among women who often rely on supportive networks during crises (Nie et al., 2015). In addition, cultural and gender-based networks contribute to identity preservation and stress buffering during migration and displacement (Herzig, 2010).

PA consistently was lower in later waves, reflecting disruptions to professional identity and personal accomplishment associated with displacement and institutional instability. Initially exacerbated by the challenges of relocation, the devaluation of PA later appeared to stabilize as individuals rebuilt professional networks and adapted to their new environments. This adaptive pattern aligns with findings on resilience and post-traumatic growth, which highlight individuals' capacity to find meaning and rebuild a sense of personal accomplishment in high-stress contexts (Tedeschi & Calhoun, 2004). Higher academic qualifications were associated with less PA decline, offering autonomy and access to professional support systems critical for sustaining a sense of personal accomplishment. This aligns with resilience theories, where adaptability, personal growth, and external resources mitigate stress impacts (Durso et al., 2021; Rushton et al., 2015; Vagni et al., 2020).

Overall, the results highlight the between-wave dynamics of burnout during prolonged stress and poly-crises, revealing shifts in associations between external stressors and personal resources. Early in the full-scale war, burnout dimensions such as EE and DP were more strongly associated with external stressors, whereas in later waves, intrinsic traits and coping capacities became more salient moderators of burnout. This pattern underscores the capacity of individuals to adapt behaviourally to prolonged adversity (Amer et al., 2022; Bayes et al., 2021; Ghorpade et al., 2007; Salvagioni et al., 2017).

This pattern across waves can also be interpreted through the lens of the crisis adaptation curve (Bonanno, 2004), which outlines diverse psychological responses to adversity – resilience, delayed recovery, and chronic dysfunction. Within this framework, some individuals or groups may not adapt immediately but instead transition gradually from psychological disorganisation to functional stabilisation. The observed late-stage improvements in some burnout dimensions, especially emotional exhaustion, may reflect a delayed yet adaptive response to sustained stress.

However, as stress persists, individuals with stronger personal and institutional support resources tend to show lower burnout levels across waves – a correspondence also observed in studies on burnout during the COVID-19 pandemic (Abraham et al., 2024). Declines in PA, a key aspect of burnout, reflect the cumulative depletion of psychological and emotional reserves, particularly when institutional scaffolding is inadequate (Maslach & Leiter, 2016). Similar dynamics have been observed in academia, where prolonged stress undermines engagement and PA (Gewin, 2021).

As noted above, the convergence of EE, DP, and PA in later waves reinforces the idea of a more generalized burnout configuration across waves. This behavioural pattern is consistent with research on chronic stress environments, where prolonged exposure leads to emotional detachment and diminished professional engagement (Maslach & Leiter, 2016). While such responses may preserve immediate functional capacity, they come at the cost of reduced motivation, relational connection, and long-term productivity.

Finally, academic staff at relocated universities showed lower EE in later waves, an association consistent with the buffering role of organizational stability and resource provision.

Overall, these findings underscore the profound behavioural consequences of prolonged crises on academic staff, including heightened emotional exhaustion, depersonalization, and diminished professional accomplishment. Addressing these challenges requires systemic strategies that foster resilience, promote adaptive coping, and sustain motivation through collective identity, peer support, and meaningful institutional engagement.

Limitations. Despite the relevance of our findings, certain limitations should be addressed when interpreting the results of the present study. First, the study used a repeated cross-sectional design; participants were not followed over time. As a result, we cannot infer within-person change, and observed differences between waves reflect population-level variation. Second, the study's focus on burnout excludes other critical dimensions of mental health, such as anxiety, depression, and post-traumatic stress, which often co-occur with burnout and could provide a more holistic perspective on the psychological burden. Third, the reliance on self-reported data introduces potential biases, including social desirability and recall bias; without triangulation against administrative indicators (e.g., absenteeism/turnover) or clinical screeners, common-method variance may affect estimates. In addition, while some contextual factors were considered, the analysis did not control for specific institutional

support efforts or interventions. Moreover, online surveys may have excluded the most severely affected individuals due to ongoing blackouts, lack of access, or acute stress, potentially leading to survivor bias and underestimation of burnout. Also, voluntary, network-based recruitment may have led to over or under-representation of certain disciplines, regions, or institution types. Finally, although the three waves of data collection captured key moments during the war, they may not fully account for the rapid and complex changes in participants' experiences under wartime conditions.

Therefore, it is recommended that future studies should prioritize longitudinal designs that follow individual participants to explore how burnout evolves over time and to evaluate the long-term effects of interventions. Expanding the scope to include additional dimensions of mental health and resilience would provide a more comprehensive understanding of the psychological challenges faced by academic staff. Future work should also consider triangulating survey data with administrative or clinical indicators to improve validity. Comparative studies across other conflict-affected regions or crises, such as natural disasters or pandemics, could also offer valuable insights into both universal and context-specific challenges.

Conclusion

This study documents between-wave differences in burnout among Ukrainian academic staff during the full-scale war: higher emotional exhaustion (EE) and depersonalization (DP) and lower personal accomplishment (PA) in later waves. The patterns observed are consistent with influences from external stressors (e.g., displacement, institutional instability) and associations with individual characteristics (age, gender, professional qualifications).

Burnout dimensions showed distinct between-wave patterns. EE exhibited the steepest increase across waves, consistent with cumulative emotional strain. DP, which was initially lower among some subgroups (e.g., older academic staff; academic staff at relocated institutions), became more prevalent in later waves, consistent with greater emotional detachment as stressors persisted. Lower PA in later waves aligns with reduced perceived personal accomplishment, particularly where professional environments were repeatedly disrupted.

The implications of this research extend beyond Ukraine offering insights into managing burnout in academia during prolonged crises. Based on our findings, practical recommendations can be stratified across three levels. At the individual level, younger and displaced academic staff with elevated EE and DP may benefit from targeted support such as cognitive-behavioural therapy, peer support groups, or acculturation training tailored to displaced faculty. At the institutional level, the protective effect of relocation observed in our data underscores the importance of contingency planning: establishing digital continuity protocols, temporary teaching spaces, and rapid deployment of psychosocial resources can mitigate burnout during institutional disruption. At the policy level, long-term resilience could be supported by integrating systematic burnout monitoring and prevention into higher education legislation and institutional quality assurance frameworks, especially in crisis-affected systems.

Future research should use longitudinal designs to track within-person change, evaluate interventions, and examine how cultural and institutional contexts shape adaptive responses to burnout. Prioritizing evidence-informed strategies that address root stressors can help safeguard staff well-being and the sustainability of educational and research missions under extreme conditions.

Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Received: 9 February 2025; Accepted: 12 November 2025;

Published online: 25 November 2025

References

Abraham A, Chaabna K, Sheikh JI et al. (2024) Burnout increased among university students during the COVID-19 pandemic: a systematic review and meta-analysis. *Sci Rep.* 14(1):2569. <https://doi.org/10.1038/s41598-024-52923-6>

Abramson LY, Seligman MEP, Teasdale JD (1978) Learned helplessness in humans: critique and reformulation. *J Abnorm Psychol* 87(1):49–74. <https://doi.org/10.1037/0021-843X.87.1.49>

Agapova O, Abuseridze G, Svintsitskyi A et al. (2024) Building resilience of Ukrainian universities in the face of military intervention: exploring forms and implication. *Environ Technol Resour* 4:15–20. <https://doi.org/10.17770/etr2024vol4.8243>

Almeida-Souza L, O'Brien L (2022) A kinder approach to science. *Trends Cell Biol* 32(3):177–178. <https://doi.org/10.1016/j.tcb.2021.11.003>

Amer S, Elota S, Ameen A et al. (2022) Occupational burnout and productivity loss: a cross-sectional study among academic university staff. *Front Public Health* 10:861674. <https://doi.org/10.3389/fpubh.2022.861674>

Ansley B, Houchins D, Varjas K et al. (2021) The impact of an online stress intervention on burnout and teacher efficacy. *Teach Teach Educ* 98:103251. <https://doi.org/10.1016/j.tate.2020.103251>

Ashforth BE, Mael F (1989) Social identity theory and the organization. *Acad Manag Rev* 14(1):20–39. <https://doi.org/10.2307/258189>

Awang Y, Mohamed N, Ahmad S et al. (2021) Examining the influence of academic and non-academic responsibilities on academicians' job-related stress in higher education. *Asian J Univ Educ* 17(4):498. <https://doi.org/10.24191/ajue.v17i4.16197>

Bayes A, Tavella G, Parker G (2021) The biology of burnout: causes and consequences. *World J Biol Psychiatry* 22(9):686–698. <https://doi.org/10.1080/15622975.2021.1907713>

Bezzubko B, Ponomarova A (2023) Displaced higher education institutions: New challenges and prospects. *Bull V N Karazin Kharkiv Natl Univ Econ Ser* 104:100–107. <https://doi.org/10.26565/2311-2379-2023-104-11>

Blyznyuk T, Sobakar M (2024) Risks in volunteer activities during the war in Ukraine. *Ukr J Appl Econ Technol* 9(2):39–42. <https://doi.org/10.36887/2415-8453-2024-2-6>

Bobrytska V (2022) Current educational reforms in Ukraine within the frame of pedagogical reflection. *Ukr Prof Educ* 12:18–23. <https://doi.org/10.33989/2519-8254.2022.12.27899>

Bodnar I (2024) Reducing the number of universities and who can enroll on the budget: what they plan to change in the education system. Available via TSN.ua. <https://tsn.ua/exclusive/skorochenny-kilkosti-universitetiv-ta-hot-mozhe-vstupiti-na-byudzhet-yaki-mozhlivi-zminy-v-osviti-2554663.html> of subordinate document. Accessed 15 Jan 2025

Bonanno G (2004) Loss, trauma, and human resilience: have we underestimated the human capacity to thrive after extremely aversive events? *Am Psychol* 59(1):20–28. <https://doi.org/10.1037/0003-066X.59.1.20>

Briggs S (2016) Teaching and research: challenges for academic staff. *Pac Conserv Biol* 22(1):1–2. https://doi.org/10.1071/PCV22N1_ED

Cordes C, Dougherty T (1993) A review and an integration of research on job burnout. *Acad Manag Rev* 18(4):621–656. <https://doi.org/10.5465/AMR.1993.9402210153>

Costas J, Prokhorova A, Stepanenko V et al. (2024) Academic activism in time of war: Voices from Ukraine. *Organ* 0(0). <https://doi.org/10.1177/13505084241284487>

Dalla C, Edgecomb C, Whetstone A et al. (2008) Females do not express learned helplessness like males do. *Neuropsychopharmacology* 33:1559–1569. <https://doi.org/10.1038/sj.npp.1301533>

De Rassenfosse G, Murovana T, Uhlbach WH (2023) The effects of war on Ukrainian research. *Humanit Soc Sci Commun* 10:856. <https://doi.org/10.1057/s41599-023-02346-x>

Diener E (2018) Happiness: The science of subjective well-being. *Noba Textbook Series: Psychology*. DEF publishers

Dinu LM, Dommett EJ, Baykoca A et al. (2021) A case study investigating mental wellbeing of university academics during the COVID-19 pandemic. *Educ Sci* 11(11):702. <https://doi.org/10.3390/educsci11110702>

Duchek S (2020) Organizational resilience: a capability-based conceptualization. *Bus Res* 13:215–246. <https://doi.org/10.1007/s40685-019-0085-7>

Durso SO, Afonso LE, Beltman S (2021) Resilience in higher education: a conceptual model and its empirical analysis. *Educ Policy Anal Arch* 29(Aug.–Dec.):156. <https://doi.org/10.14507/epaa.29.6054>

Dziuba T, Karamushka L, Halushko L et al. (2021) Mental health of teachers in Ukrainian educational organizations. *Wiad Lek* 74(11):2779–2783. <https://doi.org/10.36740/wlek202111117>

Eagle G, Kaminer (2013) Continuous traumatic stress: expanding the lexicon of traumatic stress. *Peace Confl: J Peace Psychol* 19(2):85–99. <https://doi.org/10.1037/a0032485>

Fynn A, Van Der Walt H (2023) Examining staff burnout during the transition to teaching online due to COVID-19 implications. *SA J Hum Resour Manage* 21. <https://doi.org/10.4102/sajhrm.v21i0.2062>

Gewin V (2021) Pandemic burnout is rampant in academia. *Nature* 591(7850):489–491. <https://doi.org/10.1038/d41586-021-00663-2>

Ghorpade J, Lackritz J, Singh G (2007) Burnout and personality. *J Career Assess* 15(2):240–256. <https://doi.org/10.1177/1069072706298156>

Gómez-Domínguez V, Navarro-Mateu D, Prado-Gascó VJ et al. (2022) How much do we care about teacher burnout during the pandemic: A bibliometric review. *Int J Environ Res Public Health* 19(12):7134. <https://doi.org/10.3390/ijerph19127134>

Guthrie S, Lichten CA, van Belle J et al. (2017) Understanding mental health in the research environment: a rapid evidence assessment. RAND Corporation. https://www.rand.org/pubs/research_reports/RR2022.html

Halbesleben J, Buckley M (2004) Burnout in organizational life. *J Manag* 30(6):859–879. <https://doi.org/10.1016/j.jm.2004.06.004>

Haslam SA, O'Brien A, Jetten J et al. (2005) Taking the strain: social identity, social support, and the experience of stress. *Br J Soc Psychol* 44(3):355–370. <https://doi.org/10.1348/01446605X37468>

Herzig P (2010) Communal networks and gender: placing identities among South Asians in Kenya. *South Asian Diaspora* 2(2):165–184. <https://doi.org/10.1080/19438192.2010.491296>

Hobfoll SE (1989) Conservation of resources. A new attempt at conceptualizing stress. *Am Psychol* 44(3):513–524. <https://doi.org/10.1037/0003-066x.44.3.513>

Hurenko O, Tsybuliak N, Mytsyk H et al. (2024) Organizational adaptation for inclusive education in universities amidst war. *J Gov Regul* 13(2-si):339–353. <https://doi.org/10.22495/jgrv13i2siart10>

Husbands M, Prescott J (2023) Wellbeing and pedagogical role of higher education academics in the COVID-19 pandemic: a systematized review. *Ment Health Soc Incl* 27(1):20–36. <https://doi.org/10.1108/MHSI-09-2022-0065>

Kalcza-Janosi K, Kotta I, Marschalko EE et al. (2023) The Fear of War Scale (FOWARS): Development and initial validation. *Soc Sci* 12(5):283. <https://doi.org/10.3390/socsci12050283>

Kim H, Stoner M (2008) Burnout and turnover intention among social workers: effects of role stress, job autonomy and social support. *Admin Soc Work* 32(3):5–25. <https://doi.org/10.1080/03643100801922357>

Kim HJ, Romanelli M, Fredriksen-Goldsen K (2024) Multidimensional social connectedness of sexual and gender minority midlife and older adults: Findings from the National Health, Aging, and Sexuality/Gender Study (NHAS). *Am J Orthopsychiatry* 94(3):322–338. <https://doi.org/10.1037/ort0000726>

Kinman G, Wray S (2020) Well-being in academic employees—a benchmarking approach. *Handbook of research on stress and well-being in the public sector*. Cheltenham, UK, Edward Elgar Publishing, p 152–166 <https://doi.org/10.4337/9781788970358.00019>

Kira IA, Fawzi MH, Fawzi MM (2013) The dynamics of cumulative trauma and trauma types in adults patients with psychiatric disorders: two cross-cultural studies. *Traumatology* 19(3):179–195. <https://doi.org/10.1177/1534765612459892>

Kolomirov K, Kenny N, Le-May Sheffield S (2020) A call to action: exploring and responding to educational developers' workplace burnout and well-being in higher education. *Int J Acad Dev* 25(1):5–18. <https://doi.org/10.1080/1360144X.2019.1705303>

Kunzler A, Helmreich I, Chmitorz A et al. (2020) Psychological interventions to foster resilience in healthcare professionals. *Cochrane Database Syst Rev* 7(7):CD012527. <https://doi.org/10.1002/14651858.CD012527.pub2>

Kurapov A, Pavlenko V, Drozdov A et al. (2022) Toward an understanding of the Russian-Ukrainian war impact on university students and personnel. *J Loss Trauma* 28(2):167–174. <https://doi.org/10.1080/15325024.2022.2084838>

Kushnir T, Melamed S (1992) The Gulf War and its impact on burnout and well-being of working civilians. *Psychol Med* 22(4):987–995. <https://doi.org/10.1017/S0033291700038551>

Kyrian T, Nikolaesku I, Stepanova N et al. (2020) Relationship between professional burnout of teachers of higher education institutions of Ukraine and their organizational, professional and socio-demographic characteristics. *Rev Rom Educ Multidimens* 12(4):268–288. <https://doi.org/10.18662/rrem/12.4/345>

Kyrylenko O, Zhadan O (2023) Higher education financing model in Ukraine: change of priorities. *World Financ* 2(75):140–154. <https://doi.org/10.35774/sf2023.02.140>

Lavrysh Y, Lytovchenko I, Lukianenko V et al. (2022) Teaching during the war-time: experience from Ukraine. *Educ Philos Theory* 1–8. <https://doi.org/10.1080/00131857.2022.2098714>

Levy A (2025) Mind matters: investigating academia's 'mental health crisis'. *Nature*, 10.1038/d41586-024-04240-1. Advance online publication. <https://doi.org/10.1038/d41586-024-04240-1>

Lopatina H, Tsybuliak N, Popova A et al. (2023) University without walls: experience of Berdyansk State Pedagogical University during the war. *Probl Perspect Manag* 21(2-si):4–14. [https://doi.org/10.21511/ppm.21\(2-si\).2023.02](https://doi.org/10.21511/ppm.21(2-si).2023.02)

Luo D, Song Y, Cai X et al. (2022) Nurse managers' burnout and organizational support: the serial mediating role of leadership and resilience. *J Nurs Manag* 30(8):4251–4261. <https://doi.org/10.1111/jonm.13852>

Maier S, Watkins L (2005) Stressor controllability and learned helplessness: the roles of the dorsal raphe nucleus, serotonin, and corticotropin-releasing factor. *Neurosci Biobehav Rev* 29(4–5):829–841. <https://doi.org/10.1016/j.neubiorev.2005.03.021>

Mallhi T, Khan NA, Siddique A et al. (2023) Mental health and coping strategies among university staff during the COVID-19 pandemic: a cross-sectional analysis from Saudi Arabia. *Sustainability* 15:8545. <https://doi.org/10.3390/su15118545>

Marsh E, Vallejos EP, Spence A (2022) The digital workplace and its dark side: An integrative review. *Comput Hum Behav* 128:107118. <https://doi.org/10.1016/j.chb.2021.107118>

Maslach C, Jackson SE (1984) Burnout in organizational settings. *Appl Soc Psychol Annu* 5:133–153. <https://psycnet.apa.org/record/1985-24012-001>

Maslach C, Leiter MP (2016) Understanding the burnout experience: recent research and its implications for psychiatry. *World Psychiatry* 15(2):103–111. <https://doi.org/10.1002/wps.20311>

Matud MP (2004) Gender differences in stress and coping styles. *Pers Individ Dif* 37(7):1401–1415. <https://doi.org/10.1016/j.paid.2004.01.010>

McEwen BS, Stellar E (1993) Stress and the individual. Mechanisms leading to disease. *Arch Intern Med* 153(18):2093–2101. <https://pubmed.ncbi.nlm.nih.gov/8379800/>

McManus I, Winder B, Gordon D (2002) The causal links between stress and burnout in a longitudinal study of UK doctors. *Lancet* 359(9323):2089–2090. [https://doi.org/10.1016/S0140-6736\(02\)08915-8](https://doi.org/10.1016/S0140-6736(02)08915-8)

Morgan C, Cho T, Hazlett G et al. (2002) The impact of burnout on human physiology and on operational performance: A prospective study of soldiers enrolled in the combat diver qualification course. *Yale J Biol Med* 75(4):199–205. <https://pmc.ncbi.nlm.nih.gov/articles/PMC2588792/>

Nazarovets S (2024) The publication activity and migration trends of Ukrainian scientists in the social sciences and humanities during the first two years of the Russo-Ukrainian war. *arXiv Preprint*. <https://doi.org/10.48550/arXiv.2412.11719>

Nenko Y, Orendarchuk O, Prysiazniuk Y et al. (2023) Ukrainian education during war: a scoping review. *Pr áxis Educ* 19(50):e11951. <https://doi.org/10.22481/praxedu.v19i50.11951>

Nepomnyashchyy O, Marusheva O, Prav Y et al. (2020) Certain aspects of the system of public administration of universities: World practices and the Ukrainian dimension. *J Natl Acad Leg Sci Ukr* 1:99–105. [https://doi.org/10.3763/jnalsu.28\(1\).2021.99-105](https://doi.org/10.3763/jnalsu.28(1).2021.99-105)

Ng T, Feldman D (2010) The relationships of age with job attitudes: a meta-analysis. *Pers Psychol* 63(3):677–718. <https://doi.org/10.1111/j.1744-6570.2010.01184.x>

Nie Z, Jin Y, He L et al. (2015) Correlation of burnout with social support in hospital nurses. *Int J Clin Exp Med* 8(10):19144–19149. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4694446/>

Nikolaev Y, Riy H, Shemelynets I (2023) Higher education in Ukraine: Changes due to the war. Analytical report, Kyiv, Borys Grinchenko Kyiv University <https://osvitalitytka.kubg.edu.ua/wp-content/uploads/2023/03/HigherEd-in-Times-of-War.pdf>

Official Portal of the Verkhovna Rada of Ukraine (2024) The Verkhovna Rada of Ukraine adopted the Law. Available via Verkhovna Rada of Ukraine. <https://www.rada.gov.ua/news/razom/250490.html> of subordinate document. Accessed 16 Jan 2025

Orzhel O, Trofymenko M, Porkuiyan O et al. (2023) Displaced universities in Ukraine: Challenges and optimal development models. *Eur J Educ* 58(4-si):629–646. <https://doi.org/10.1111/ejed.12581>

Papadeli C, Filippou A, Nikolakaki M et al. (2022) Economic crisis and educational reforms: How burnout affects teachers' physical, mental, and oral health? *Asian J Humanit Soc Stud* 10(2). <https://doi.org/10.24203/ajhss.v10i2.6872>

Pedditzi M, Nicotra E, Nonnis M et al. (2020) Teacher stress and burnout: a study using MIMIC modelling. *Electron J Appl Stat Anal* 13(3):739–757. <https://doi.org/10.1285/I20705948V13N3P739>

Petrushenko Y, Vorontsova A, Dorczak R et al. (2023) The third mission of the university in the context of war and post-war recovery. *Probl Perspect Manag* 21(2-si):67–79. [https://doi.org/10.21511/ppm.21\(2-si\).2023.09](https://doi.org/10.21511/ppm.21(2-si).2023.09)

Popa-Velea O, Diaconescu L, Mihăilescu A et al. (2017) Burnout and its relationships with alexithymia, stress, and social support among Romanian medical students: a cross-sectional study. *Int J Environ Res Public Health* 14(6):560. <https://doi.org/10.3390/ijerph14060560>

Rodríguez-De Avila UR, Paba-Argote Z (2023) Young vs adults: adaptability to ICTs, resilience, anxiety and depression in university students and professors. *Eur Psychiatry* 66(1-si):461–462. <https://doi.org/10.1192/j.eurpsy.2023.990>

Rushton CH, Batcheller J, Schroeder K et al. (2015) Burnout and resilience among nurses practicing in high-intensity settings. *Am J Crit Care* 24(5):412–420. <https://doi.org/10.4037/ajcc2015291>

Salvagioni D, Melanda F, Mesas A et al. (2017) Physical, psychological and occupational consequences of job burnout: A systematic review of prospective studies. *PLoS ONE* 12(10). <https://doi.org/10.1371/journal.pone.0185781>

Seligman MEP (1972) Learned helplessness: theory and evidence. *J Exp Psychol Gen* 105(1):3–46. <https://doi.org/10.1037/0096-3445.105.1.3>

Severyn N, Severyn V (2023) Distance education in Ukraine under martial law. *N Collegium* 3(111):18–23. <https://doi.org/10.30837/nc.2023.3.18>

Sharifian MS, Hoot JL, Shibly O, Reyhanian A (2023) Trauma, burnout, and resilience of Syrian primary teachers working in a war zone. *J Res Child Educ* 37(1):115–135. <https://doi.org/10.1080/02568543.2022.2076267>

Shin J, Jung J (2014) Academics' job satisfaction and job stress across countries in the changing academic environments. *High Educ* 67:603–620. <https://doi.org/10.1007/S10734-013-9668-Y>

Singh S, Pradhan R, Panigrahy N et al. (2019) Self-efficacy and workplace well-being: moderating role of sustainability practices. *Benchmarking* 26(6):1692–1708. <https://doi.org/10.1108/BIJ-07-2018-0219>

State Statistics Service of Ukraine (2025) Higher and pre-higher education—academic staff (dataset). Available at: <https://stat.gov.ua/uk/explorer?md5=537e4dfe5fc3c4610a2cd282ef614dca> (accessed 27 Sep 2025)

Stevens G, Eagle G, Kaminer D, Higson-Smith C (2013) Continuous traumatic stress: conceptual conversations in contexts of global conflict, violence and trauma. *Peace Conf: J Peace Psychol* 19(2):75–84. <https://doi.org/10.1037/a0032484>

Suchikova Y, Kolomiets U, Popova A et al. (2024) Calm me down, or I'll leave: anxiety and institutional support among Ukrainian academic staff during wartime. *BMC Public Health* 24:3483. <https://doi.org/10.1186/s12889-024-21040-4>

Sytnyko V, Petrenko T, Bezkorovaina O et al. (2024) Challenges for universities to online technologies implementation in the conditions of war in Ukraine. *Inf Technol Learn Tools* 99(1):1–11. <https://doi.org/10.33407/tilt.v99i1.5436>

Tedeschi RG, Calhoun LG (2004) Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychol Inq* 15(1):1–18. https://doi.org/10.1207/s15327965pli1501_01

The Ukrainians (2023) Mykhailo Vynnytskyi: "Ukraine is a country of opportunities, but the price for them is risks". Available via The Ukrainians. <https://theukrainians.org/mykhailo-vynnytskyi-mon/?fbclid=IwAR08ApVwWU00qK8ESDBkkOYm9oShXm9LoaLA3jwSaWQ4vjn8ijH2cuf2c> of subordinate document. Accessed 15 Jan 2025

Thielmann B, Hoffmann T, Zavgorodnii I et al. (2022) Work ability and analysis of stress-relevant coping with demands of teachers—a cross-sectional comparative study in Germany and Ukraine. *J Occup Environ Med* 64(8):686–693. <https://doi.org/10.1097/JOM.00000000000002565>

Tsybuliak N, Lopatina H, Shevchenko I et al. (2024) Burnout and migration of Ukrainian university academic staff during the war. *SAGE Open* 14(3). <https://doi.org/10.1177/21582440241279137>

Tsybuliak N, Suchikova Y, Gurenko O et al. (2023) Ukrainian universities at the time of war: from occupation to temporary relocation. *Torture* 33(3):39–64. <https://doi.org/10.7146/torture.v33i3.136256>

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2024) Analysis of war damage to the Ukrainian science sector and its consequences. Paris, UNESCO <https://www.unesco.org/en/open-access/cc-sa>

Vagni M, Giostra V, Maiorano T et al. (2020) Personal accomplishment and hardness in reducing emergency stress and burnout among COVID-19 emergency workers. *Sustainability* 12(21):9071. <https://doi.org/10.3390/su12219071>

Varnalyi Z, Krasilnyk O (2017) Optimization of financing public higher education institutions in Ukraine. *Bull Taras Shevchenko Natl Univ Kyiv Econ* 5(194):6–13. <https://doi.org/10.17721/1728-2667.2017/194-5>

Velykodna M, Mishka N, Miroshnyk Z et al. (2023) Primary education in wartime: How the Russian invasion affected Ukrainian teachers and the educational process in Kryvyyi Rih. *Rev Rom Educ Multidimens* 15:285–309. <https://doi.org/10.18662/rrem/15.1/697>

Vinokur AD, Pierce PF, Lewandowski-Romps L, Hobfoll SE, Galea S (2011) Effects of war exposure on air force personnel's mental health, job burnout and other organizational related outcomes. *J Occup Health Psychol* 16(1):3–17. <https://doi.org/10.1037/a0021617>

Waaijer C, Teelken C, Wouters P et al. (2018) Competition in science: links between publication pressure, grant pressure and the academic job market. *High Educ Policy* 31:225–243. <https://doi.org/10.1057/S41307-017-0051-Y>

Watts J, Robertson N (2011) Burnout in university teaching staff: a systematic literature review. *Educ Res* 53:33–50. <https://doi.org/10.1080/00131881.2011.552235>

Winefield A, Jarrett R (2001) Occupational stress in university staff. *Int J Stress Manag* 8:285–298. <https://doi.org/10.1023/A:1017513615819>

Winefield HR, Boyd C, Winefield AH (2014) Work-family conflict and well-being in university employees. *J Psychol* 148(6):683–697. <https://doi.org/10.1080/00223980.2013.822343>

Wolf S, Torrente C, McCoy M, Rasheed D, & Aber JL (2015) Cumulative risk and teacher well-being in the Democratic Republic of the Congo. *Comparative Education Review* 59(4). <https://doi.org/10.1080/682902>

World Health Organization (2019) International statistical classification of diseases and related health problems. Available via WHO. <https://icd.who.int/browse11/l-m/en> of subordinate document. Accessed 16 Jan 2025

World Health Organization (2022) Mental health. Available via WHO. <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response> of subordinate document. Accessed 16 Jan 2025

Xia J, Zhang MM, Zhu J et al. (2019) HRM reforms and job-related well-being of academics. *Perf Rev* 49:597–619. <https://doi.org/10.1108/PR-05-2018-0188>

Zozulak O, Bashuryn N (2023) Relocation as a form of organizing the educational process at Ukrainian universities which suffered as a result of war activities: The experiences of the Kherson National University and the Vasyl Stefanyk Precarpathian National University. *Int J Leg Stud* 16(4-si):141–168. <https://doi.org/10.5604/01.3001.0054.5508>

Acknowledgements

The research teams acknowledge the Armed Forces of Ukraine for providing safety during their research and credit their perseverance and courage for making this possible. Natalia Tsybuliak is grateful to the Ukraine Research Network@ZOIS, funded by the German Federal Ministry of Education and Research, for support in implementing the research. This work was supported by the Ministry of Education and Science of Ukraine under Grant No. 0125U001388.

Author contributions

The conceptualization was carried out by N.T. and Y.S. The methodology was developed by N.T., A.P. and Y.S. U.K. and Y.P. curated the data. The original draft was written by N.T., Y.P., H.L., and A.P. N.T. and Y.S. performed writing, reviewing, and editing. All authors read and approved the final manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

All procedures complied with the Declaration of Helsinki, the Belmont Report, national legislation of Ukraine, and Berdyansk State Pedagogical University (BSPU) regulations. The study began as a single-wave, minimal-risk, anonymous online survey of adult university staff and received prior approval from the BSPU Ethics Committee under Protocol No. 05/2022 (covering Wave 1). After deciding to extend the project into a multi-wave design, we submitted an amended protocol for prospective review. The Ethics Committee approved the continuation under Protocol No. 12/2023, which authorised Waves 2–3 and confirmed the ethical permissibility of analysing the Wave 1 dataset collected under informed consent and the same data-protection safeguards.

Informed consent

In each wave, participants viewed an information page describing the study purpose, procedures, voluntary nature of participation, the right to skip questions, and the right to withdraw before submission without penalty. Electronic informed consent was documented via a mandatory tick-box with server time-stamp immediately before accessing the questionnaire. No data were collected from individuals who did not give their consent. Data collection occurred during: Wave 1 (01 July 2022–30 July 2022), Wave 2 (04 January 2023–31 January 2023), and Wave 3 (04 January 2024–31 January 2024). The privacy of the participants has been safeguarded at all stages of the research. No direct identifiers were collected; IP addresses and contact details were not stored. Free-text responses were screened to remove potentially identifying content. Data were used exclusively for academic purposes and analysed only in aggregate to protect confidentiality. The study posed no more than minimal risk. The principal foreseeable discomfort was possible emotional strain when reflecting on burnout-related experiences. The information sheet signposted freely available psychological support resources, and participants were encouraged to seek support if needed.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1057/s41599-025-06322-5>.

Correspondence and requests for materials should be addressed to Natalia Tsybuliak.

Reprints and permission information is available at <http://www.nature.com/reprints>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

 **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2025