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Post-traumatic stress disorder among nursing students at Palestine Polytechnique University during the Gaza war and the attack on the health care system

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Abstract

Background Gaza war and the attack on the healthcare system and healthcare personnel influenced the Palestinian people's psychological status, especially healthcare professionals and university students.

Aim The study aims to explore the impact of Gaza war on nursing students of Palestine Polytechnique University (PPU).

Method In a cross-sectional design, 272 nursing students completed the Impact of Event Scale-Revised (IES-R). Chi-square test used to examine the association of PTSD severity with demographic variables; independent samples *t*-tests and ANOVA were used to compare means of PTSD subscales (intrusion, avoidance, and hyperarousal); relationships between subscale scores and the total IES-R score were assessed using Pearson correlation coefficients.

Results 71.3% of the Nursing students had high levels of PTSD symptoms, 14.7% were classified as having probable PTSD diagnosis, 10.7% had clinical concerns, and 3.3% with no clinical concern; hyperarousal and intrusion were the highest subscale scores; females showed higher levels of PTSD symptoms compared to males ($p < .05$); feelings of guilt when practicing happy events; negative impact on study significantly associated with higher PTSD severity ($p < .05$).

Conclusion The study highlighted the significant impact of Gaza war events on nursing students' mental health as evidenced by a high level of PTSD symptoms, despite the aggressive attack on health care system during war on Gaza students found to have high willingness to challenge and pursue in their future nursing career.

Implications Targeted supportive mental health programs, resiliency, and coping mechanisms are needed for nursing students in the Palestinian context.

Keywords War on Gaza, PTSD, University students, The impact of war

Introduction

For more than half a century, the Palestinian nation has suffered from traumatic events. Since the beginning of the second Intifada in 2000, Israeli military violence has been practiced in the Palestinian nation in different ways, including restriction of movement checkpoints, closures of shootings, bombings, demolition, and arresting, in addition to physical violence and deaths occurrence daily [1]. Since the 7th of October and the restless war against Gaza in Palestine, a devastating impact and

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definitive psychological strain have been found on all the Palestinians; the health care system including hospitals was targeted by the Israeli military forces including doctors and nurses; the war consequences have put tremendous strain on health care workers, facing unprecedented challenges to provide and continue their health care services and assistance for the overwhelming number of casualties while confronting complicated conditions of crushed limbs and severe cases of burn injuries in a restricted health care services, with deficient medical supplies forced by Israel's complete blockade of Gaza, adding to that the excess mortality from indirect causes that have caused under-reporting of Palestinian Ministry Of Health information systems [2]. The health care professionals had to continue working while trying to overcome their mixed feelings of constant fear, anxiety, despair insecurity, and uncertainty yet showing commitment and desire to respond to the call for their humanitarian duty for constant long hours under threat of death in any time, leaving their families while not being certain meeting again; moreover, most of them have lost their houses and their beloved ones which have added another burden and strain on the psychophysical status, added to the physical exhaustion which may impede effective care delivery. Médecins Sans Frontiers (MSF), a charity that provides humanitarian medical care known as Doctors Without Borders, has described such working situations as leaving scars for many years to come ahead; health-care professionals continued to work despite the psychological toll and human cost. Symptoms of psychological stress have been seen in the medical staff which was represented by continuous stress and exhaustion, insomnia, depression, intrusive thoughts, emotional avoidance, and nightmares [3]. Medical personnel in Gaza operate in an unprotected context against the International Humanitarian Law (IHL), and the profound psychological impact hinders their well-being and compromises their ability to deliver critical care to civilians [4]. Israel's blatant and total disregard for Gaza's medical facilities and humanitarian workers' protection subjected them to evacuation orders; they also besieged, raided, and repeatedly attacked medical staff and patients, arrested, abused, and killed while caring for patients; those who remained inside the hospital described a horrific scene, where patients are trapped with limited food and no electricity or running water [5]. Health care professionals were targeted by Israeli forces attacks; hospitals were broken into and destroyed, and many workers were executed at their place of work, as well as arrested, and tortured with the testimony of individuals who had been there in the field when Israeli forces invade the hospitals; moreover, many of other health care team still missing. Human Rights Watch (HRW) declared that Israeli

repeated attacks on hospitals, medical facilities, personnel, and transport should be investigated as war crimes [6]. The systemic oppression and human rights violation by Israeli policies in the Palestinian territories led to stark inequalities in health care accessibility, availability, acceptability, and quality, viewed as "medical apartheid" [7]. WHO's Surveillance System for Attacks on Health Care (SSA) defines an attack on health care as: "Any act of verbal or physical violence or obstruction or threat of violence that interferes with the availability, access, and delivery of curative and preventive health services during emergencies [8]." Attacks against the health sector infrastructure can have a significant and long-lasting impact on the care provided [9]. The systematic attack on the healthcare system has severe consequences on the quality of healthcare services hindering access to the population and going against medical impartiality [10]. Preservation of human life is considered a core health ethic that has been betrayed by the Israeli attack on health care [4]. The healthcare system was targeted in previous wars in Gaza in which hospitals, healthcare centers, and desalination plants were damaged impacting healthcare services and water supply to the healthcare facilities by the escalating conflict [11]. Similarly in other conflict zones such as the Ukrainian healthcare facilities have been destroyed and complained of a shortage of medicine and a lack of qualified medical staff as a result of the Russian invasion [12]. The human crisis that occurred post-Russian aggression on Ukraine negatively affected not only the economy but also the medical system [13]. On the other hand, conflict in Syria has politicized all aspects of medical education and health professionals' training (MEHPT) [14]. Widespread damage to vital civilian infrastructure violated the (IHL) international humanitarian law by spatial statistical analysis, particularly given the blatant incitement of violence and displacement in statements made by Israeli officials and the numerous highly publicized instances of collective punishment [14]. The systemic violation was evidenced by geospatial analysis of infrastructure as it detected no difference in the odds of damage between medical complexes and all other buildings in the first months of the attack [14]. Accountability and protection of healthcare services during conflicts should be ensured, and measures to protect healthcare facilities should be implemented in conflict zones [10]. Safeguards for healthcare facilities and employees in conflict areas, such as Gaza, must be ensured to guarantee the provision of basic medical services and the security of healthcare staff [4]. Humanitarian efforts should be emphasized in mitigating the challenges faced in providing healthcare during times of war [15]. Contemporary nursing has developed out of war; nursing work is not only limited to caring for victims in war zones but they also have the

responsibility to avert illness, promote the well-being of humans, alleviate suffering, and manage long-term consequences caused by wars. In addition to being politically active in conflict resolution at national and international levels. Palestinian students' academic achievement was influenced by the Israeli-Palestinian conflict during the Second Intifada reducing their probability of passing the final high school exam and gaining university admission [16]. Additionally, Students with PTSD group presented with worse academic performance [17]. Palestinian university students are influenced by the conflict in the West Bank as they experience poor physical and mental well-being, stress, and insecurity [18]. Traumatic exposure to cumulative stress harms cognitive function [19–24]. Moreover, previous studies have shown that symptoms associated with PTSD impair student executive functioning, attention span, memory capacity, and speed of information processing which in turn will influence the process of learning and achievement [25, 26]. In the case of Palestinian territories, high stressors and prolonged trauma are driven by political and environmental factors affecting people's health and mental well-being [19].

PTSD in the Palestinian context

The psychological disorder post-traumatic stress disorder (PTSD) is brought on by exposure to one or more stressful events. The symptoms of post-traumatic stress disorder (PTSD) are avoidance, altered thoughts and feelings, and increased physiological arousal after the occurrence; female adults and adolescents are more likely to be diagnosed than male adults, developing post-traumatic stress disorder. PTSD is influenced by several factors, including the intensity, frequency, and duration of the traumatic experience; individual factors, such as behavioral avoidance, and cognitive appraisals; and biological and genetic factors. Cognitive-behavioral therapy is one type of psychotherapy that is supported by evidence. Additionally, there are supplementary therapies (such as yoga and meditation) and pharmaceutical treatment options for particular conditions [27]. The prevalence of post-traumatic stress disorder (PTSD) in the Eastern Mediterranean Region is estimated to be 15.3 to 37.4% among adult civilians who were exposed to abused human rights, violent conflict, and war [28]. Palestinian adults, youth, children, and their families in the Gaza Strip living under occupation are recurrently at an enormous risk of developing psychological problems and long-term PTSD; it was also found that adolescents have Chronic Traumatic Stress Disorder (CTSD) rather than PTSD by a longitudinal study of the years 2006–2021 [19]. Severe symptoms of PTSS, depression, and sleep problems with high rates of suicidal ideation and attempts were found among university students by prolonged exposure to violence [29].

Findings showed that university students living in the Gaza Strip suffered from severe PTSD after the 2021 year war on Gaza [30]; intervention programs were needed to diminish the level of stress and trauma among these students after the current war. Moreover, the psychological well-being and mental health of the Palestinian students in the Gaza Strip were negatively influenced by the ongoing violation of human rights with disturbed sources of resilience and hope [31]. Elevated symptoms of depression, anxiety, and signs of global distress were found among young Palestinians post-exposure to violence with a high proportion of females compared to their counterparts [32]. It was found that 36% of Palestinian children and teenagers exposed to political violence suffer from post-traumatic stress disorder (PTSD), while based on the pooled data from various studies, interestingly, no significant differences related to the region of West Bank or Gaza [33]; it was also found that higher levels of post-traumatic stress symptoms (PTSS) such as avoidance, intrusion, and arousal were found in the Palestinian adolescents exposed to political violence (EPV) with reported lower self-esteem [34]. Depression, anxiety, and high rates of PTSD were identified among Palestinian youth in the Gaza Strip [35]; after the previous war of 2014 in Gaza, a high prevalence of PTSD among female healthcare providers was found compared to their counterparts. Intrusion domain was the highest, followed by avoidance and hyperarousal, indicating the specific areas of distress [30]; this was similar to another study by [36] who found a high level of anxiety level with long-term mental health problems among university students who have exposed to previous traumatic events during the Gaza war; female university students showed less resilience, personal competence, and trust in their instincts compared to male students, indicating potential variations in coping mechanisms based on gender. A positive correlation was found between PTSD symptomatology and sleep disturbance and depression levels while negatively affecting students' well-being near conflict zones [37]; it was also concluded that post-traumatic stress disorder symptoms persisted for university students after the war in Iraq and Syria, as the stressful events were perceived as life-threatening, and it was significantly correlated with the scores of depression and anxiety [36], in congruence with previous research findings of high prevalence of trauma exposure and PTSD symptoms among university students in Deir-el-Zor in Syria [38]. The traumatic events of the war on the Gaza Strip have extended to the West Bank where Palestinians negatively influenced as a consequence of the war on Gaza; many aspects of life have been negatively influenced, including the economy and education by constant closure and Israeli attacks, arresting, and killing, through day and

night attacks, which reflected on people psychological status and well-being. Additionally students faced challenges and difficulties to continue their education, reaching the university campus, financial issues, scarcity of job opportunities for their families influence the cycle of life and the stability of the life process in West Bank post-war on Gaza; nursing students were exposed to huge difficulties to continue their education, accomplishing their clinical practicum in hospitals in the Palestine Polytechnic University, especially under the loss of their nursing student colleague who was shot on one of the Israeli occupation barriers while coming to university; adding the everyday cumulative stressing and difficult scenes of traumatized and injured casualties of the war, especially witnessing aggressive attack on the health care workers and hospitals, this study aims to assess the impact of the war events and the attack on the health care system on Gaza on the nursing students of the Palestine Polytechnic University; this research tend to answer the question of what is the impact of Gaza war on the nursing students in PPU and what demographic variables relate to the level of PTSD symptoms.

Materials and methods

Study design, participants, and procedure

A cross-sectional study was conducted at Palestine Polytechnic University, a convenient sample of 272 nursing students participated through invitations to student groups disseminated via WhatsApp and emails. The sample size was considered based on a total population of 750 nursing students in the university, using a sample size calculator. The calculated sample size was approximately 255 participants, certifying sufficient power to detect meaningful effects. Only nursing students from all nursing academic levels in the university were included in the study, excluding other students from the university who were in the health professions. The study was conducted with the highest regard for the participants' rights and well-being. Informed consent was obtained from all nursing students who participated in this study. Ethical approval of the study was granted by the Research Ethics Committee of Palestine Polytechnic University (reference number: KA/41/2024). Participants were assured about their anonymity, data confidentiality, and the right to withdraw without any consequences.

Study instruments

An online questionnaire was distributed among the participants in two parts: the first part measured the sociodemographics of the participants such as gender, level of university nursing study, and three other questions inquiring about the psychological impact of the attack on the healthcare system on their study patterns and for the

future fear of similar events in the West Bank, the second part consisted of the Impact of Event Scale-Revised (IES-R). The IES-R comprises 22 items containing three subscales that describe major features (intrusion, avoidance, and hyperarousal) of PTSD relevant to a specific trauma after the war on Gaza. The validity and reliability of the Impact of Events Scale-Revised (IES-R) have been extensively studied in various populations and contexts; the Ukrainian version was found to have robust psychometric properties with an overall reliability coefficient alpha 0.91 and moderate correlation indicating that IES-R is relevant for screening wartime impact and assesses PTSD symptoms rather than underlying traits [39]. Arabic and Persian version demonstrated good construct validity, reliability, and convergent validity showing efficiency in assessing post-traumatic stress disorder during the COVID-19 pandemic [40, 41]. The Arabic version was obtained by back-to-back translations into English according to standards declared by the World Health Organization. The current study demonstrated a good reliability test ($\alpha = .85$).

Ethical considerations

The Palestine Polytechnic University Institutional Review Board authorized the study plan (No. KA-41). Participants were initially presented with a consent document proving that the data collection was done solely for scientific purposes, with entirely voluntary participation to aid in the researchers' investigation of the psychological effects of the war on Gaza. Anonymity was made clear that any personal information gathered would not be shared, sold, or otherwise contacted.

Statistical analysis

IBM SPSS Statistics version [27] statistical analyses software was used. Descriptive statistics of the demographic characteristics of the participants were used; the severity of PTSD symptoms was measured by the Impact of Event Scale-Revised (IES-R). Kolmogorov-Smirnov and Shapiro-Wilk tests were used for testing the normality of continuous data; the tests indicated that the total scores of IES-R for both males and females, as well as for different academic years, did not significantly deviate from a normal distribution ($p > 0.05$), justifying the use of parametric tests for further. Reliability test was conducted for the IES-R scale with 22 items to assess Cronbach's alpha, and relationships between subscale scores and the total IES-R score were computed using Pearson correlation coefficients. Categorical variables, such as academic year, gender, and war influence on the study, and feelings of guilt were tested for association with the severity categories of PTSD symptoms (no clinical concern, clinical concern, probable PTSD, and high PTSD) with chi-square

tests of independence. The findings are reported with the appropriate chi-square values, degrees of freedom, and *p*-values to indicate the strength and significance of the associations. The significance level was set at 0.05 for all tests. The mean subscale scores were compared with gender using independent samples *t*-tests. The mean subscales scores of (intrusion, avoidance, and hyperarousal) differences across different academic years (first, second, third, and fourth-year students) were tested using one-way analysis of variance (ANOVA). Post hoc comparisons with the Tukey HSD test were conducted to further explore any significant differences between specific groups.

Results

Characteristics of the participant

Distribution of nursing students across multiple academic years were engaged in the study. The majority of participants 28.3% were in the first year, followed by 26.5% from the fourth year, 24.3% from the third year, and the lowest percentage 21.0% were from the second year. Female participants were predominantly represented in the sample comprising 71.3% of the total sample, while 28.7% of the participants were males (Table 1). The vast majority of the respondents acknowledged that war events influenced their study, as the majority of participants (94.5%) answered positively, while a minor portion (1.5%) reported no impact on their study, and 4.0% were uncertain if war events influenced them. The majority of participants (69.1%) reported feeling guilty when living happy events or occasions during the time of the war on Gaza, while only a small proportion (2.9%) indicated that they did not experience feelings of guilt, while 27.9% answered sometimes. However, 72.1% expressed feelings proud, power, and challenge about their future work in the medical field, and 12.1% of the participants reported no such fear; however, 15.8% reported feeling fearful and concerned about their future post-attack on the health care system and health care personnel (Table 1).

Reliability

The IES-R scale with 22 items has a Cronbach’s alpha of 0.849, indicating good internal consistency and a good level of reliability in measuring PTSD symptoms in the sample. Strong positive correlation between the total score of IES-R and each subscale score, intrusion (*r* = 0.856), avoidance (*r* = 0.738), and hyperarousal (*r* = 0.873), is highly significant (*p* < 0.01), with strong positive correlations among the subscale scores themselves, intrusion with avoidance (*r* = 0.350), intrusion with hyperarousal (*r* = 0.760), and avoidance with hyperarousal (*r* = 0.437), suggesting a strong association between different symptoms of post-traumatic stress disorder (PTSD).

Table 1 Sociodemographic characteristics of participants

Characteristic	Frequency	Percent
Gender		
Female	194	71.3%
Male	78	28.7%
Year of study		
First	77	28.3%
Second	57	21.0%
Third	66	24.3%
Fourth	72	26.5%
The feeling of guilt in happy events		
Yes	188	69.1%
No	8	2.9%
Sometimes	76	27.9%
Influence of war on study		
Yes	257	94.5%
No	4	1.5%
Maybe	11	4.0%
Future Fear of work in the medical field		
Yes	43	15.8%
No	33	12.1%
Feeling strong, proud, and challenged	196	72.1%
Gender		
Female	194	71.3%
Male	78	28.7%
Year of study		
First	77	28.3%
Second	57	21.0%
Third	66	24.3%
Fourth	72	26.5%

Table 2 PTSD score categories according to the severity

Category	Frequency	Percent %
No clinical concern	9	3.3
Clinical concern	29	10.7
Probable PTSD dx	40	14.7
High	194	71.3
Total	272	100.0

The classification of severity score provides a breakdown of participants based on their levels of PTSD symptoms as measured by the IES-R score

PTSD among participants and related variables

The majority of the respondents 71.3% had high-impact symptoms experiencing high levels of PTSD symptoms (Table 2). Out of the 272 participants, only 9 students 3.3% were classified as having no clinical concern regarding PTSD symptoms, 10.7% had clinical concerns and showed symptoms that may warrant further clinical attention, and 14.7% were classified as having probable PTSD diagnosis as these students met the criteria for PTSD based on their symptom severity.

The mean subscale of items results (Table 3) found higher mean scores for intrusion and hyperarousal (2.6, 2.2), respectively among participants compared to avoidance symptoms (1.6); the variability in standard deviations moderate to high indicates a diversity of experiences among participants across all three domains.

The independent samples *t*-test results (Table 4) indicated statistically significant mean differences in PTSD subscale scores between males and females. It was found that females significantly experienced higher levels of hyperarousal symptoms ($t(270) = 3.956, p < 0.001$) and intrusion symptoms ($t(270) = 2.592, p = 0.010$), compared to their counterparts, while there were no significant differences between academic year and PTSD categories

Associations between PTSD severity and various demographic and psychological factors have been examined among 272 participants by the chi-square test (Table 5) which revealed several significant associations between gender and PTSD severity ($\chi^2(3) = 9.703, p = .021$). Females were more likely to have higher PTSD severity categories compared to their counterparts. Participants who reported a significant influence of war events on their study had high severity of PTSD symptoms ($\chi^2(6) = 13.401, p = .037$). Moreover, those who felt guilty when participating in happy events tend to have higher PTSD severity ($\chi^2(6) = 18.382, p = .005$). Yet the year of study was not significantly associated with PTSD severity ($\chi^2(9) = 8.687, p = .467$).

Discussion

This study explored the impact of the war on Gaza events and the attack on the health care system on nursing students, by uncovering the level and severity of post-traumatic stress disorder (PTSD) symptoms among different levels of nursing students; high levels of PTSD symptoms were found among the participants; the findings were consistent with similar previous research conducted post earlier wars on Gaza, in addition to the presence of aggressive oppression on the Palestinians in the West Bank [29, 34, 35, 42]. One of the reasons that may justify these findings is that nursing students are still fragile and have not been subjected to the stressful events as their counterparts working in hospitals; this may be changed in the

Table 3 The mean score of subscales of the IES-R scale

Subscale	N	Minimum	Maximum	Mean	Std. deviation
Intrusion	272	.25	4.00	2.6098	.72439
Avoidance	272	.13	3.38	1.6273	.71606
Hyperarousal	272	.00	4.00	2.2267	.78505

Table 4 Independent samples *t*-test for PTSD Subscales by gender

Subscale	F	Sig.	df	Sig. (2-tailed)	Mean difference
Avoidance	0.038	0.846	0.641	270	0.522
			0.638	140.618	0.525
Hyperarousal	0.289	0.591	2.592	270	0.010*
			2.508	132.949	0.013
Intrusion	1.062	0.304	3.956	270	< 0.001*
			3.711	125.274	< 0.001

* Significant at $p \leq 0.05$

future afterlife experience in hospital settings, which may be further investigated in future research investigating the variation PTSD in between university and hospital work; at the same time, universities expected to consider this through curriculum modification considering stress management and psychological counseling as part of the educational programs, especially for health professions. Moreover, the study findings have revealed that female nursing students exhibited higher levels of PTSD symptoms and higher levels of hyperarousal and intrusion compared to males; gender differences were supported by previous research evidence [30, 32, 36]. Additionally, it was found that factors such as the presence of negative influence on study patterns and feelings of guilt are significantly associated with higher PTSD severity; accordingly, previous studies have shown a similar impact of PTSD symptoms on the worsening of academic achievement [17, 25, 26, 37]. The current findings underscore the interplay of psychological factors in PTSD severity among nursing students; however, despite the high level of PTSD symptoms in this study, the majority of nursing students answered positively concerning feelings of challenge and power as being part of the future healthcare system through there was an aggressive attack on the health care personnel, compared to a minor portion who have stated their fear from the upcoming future in the medical field; such results confirm the nursing students willingness and insistence to challenge and overcome their feelings and emotions regarding their career aspirations in the nursing field; the study findings highlighted the urgent need for targeted interventions

Table 5 Chi-square test results for PTSD severity categories

Variable	χ^2 value	df	<i>p</i> -value
Gender	9.703	3	.021
Year of study	8.687	9	.467
War influence on study	13.401	6	.037
Feeling guilty when happy	18.382	6	.005

programs aimed at reducing PTSD symptoms among university students of health professions in conflict-affected regions of the Palestinian context. Counseling services should be invested by administrators and collaborators to enhance the coping mechanisms and psychological well-being of university students. On the other hand, nursing students must be prepared to simulate war situations and disaster management ideologies [43] have discussed political socialization as a strategy that nurtures psychological resilience and mitigates PTSD susceptibility thus safeguarding the psychological well-being of the Palestinian people amidst arduous adversities; he also described political socialization as a technique by which people adapt to the political environments in which they live; internalize the political values and ideologies of their society and recognize its symbols and rituals, such strategies, will also contribute to preparing nursing students for the emotional connections and needs of patients, enhancing students' realistic learning experiences, practical skills, and sense of humanitarianism that will also improve their understanding of human rights, innovation during wartime, fostering a sense of altruism among future nursing professionals. The study results reflected a real current life situation that the Palestinian people are suffering; the representation across different academic phases of nursing students enhanced the robustness and reliability of the study findings, providing insights into potential changes or trends over time. Yet the sample size may not be large enough to uncover more subtle associations. The cross-sectional design restricted causal inferences, in addition to the self-reported questionnaire that may hindered reporting symptoms and experiences, larger and more diverse samples, with confounding variables control might be needed. Further cohort research is needed to find out the long-term consequences of PTSD on students.

Conclusion

The study revealed a high-level impact of Gaza war events represented by a high level of PTSD symptoms among the nursing students of PPU, with a high level of intrusion and hyperarousal, female students exhibited higher levels of PTSD symptoms, additionally, study patterns were negatively influenced, with feelings of guilt in normal life were the most founded effects, yet feeling challenged proud and insistence to continue their carrier field of nursing despite the attack on the health care system.

Abbreviations

PTSD	Post stress traumatic disorder
PPU	Palestine Polytechnique University
MSF	Médecins Sans Frontiers (doctors without borders)

WHO	World Health Organization
HRW	Human Rights Watch
MEHPT	Medical education and health professionals training
IES-R	Impact Event Scale-Revised
EPV	Exposed to political violence

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Author's contributions

Nadia Amro wrote and reviewed the manuscript, prepared all including analysis.

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Data availability

Data are available on call.

Declarations

Ethics approval and consent to participate

Informed consent was obtained from all nursing students who participated in this study. Ethical approval of the study was granted by the Research Ethics Committee of Palestine Polytechnic University (reference number: KA/41/2024). Participants were assured about their anonymity, data confidentiality, and the right to withdraw without any consequences.

Consent for publication

The manuscript contains no images or videos—not applicable.

Competing interests

The authors declare no competing interests.

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