

BURNOUT AND RESILIENCE AMONG PHYSICAL THERAPY STUDENTS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: This study aimed to examine the prevalence of burnout, determine burnout-related factors, investigate resilience levels, and assess the relationship between burnout and resilience among physical therapy (PT) students at King Saud University (KSU) in Saudi Arabia. **Material and Methods:** This cross-sectional study involved 153 PT students studying at KSU between January and March 2023. The participants completed an online questionnaire, a *Maslach Burnout Inventory*, and a *Brief Resilience Scale*. **Results:** Low-to-moderate levels of *Emotional Exhaustion* (EE) were observed in 85% of the participants and high *Depersonalization* (DP) levels were reported by 34.2%. Female participants reported higher levels of EE and DP, whereas males had a greater prevalence of low *Personal Achievement* (PA) levels. Approximately 6.5% of the study participants reported high burnout levels (a combination of high DP, high EE, and low PA). Academic stress, followed by sleeping difficulties and changes in the academic year structure, were the most important factors contributing to higher levels of burnout (75.2%, 56.9%, and 43.8%, respectively). Most study participants around (66.0%) reported normal resilience levels. A significant correlation was detected between resilience and 2 domains of burnout (DP and PA), with the correlation being negative and weak for DP and positive and moderate for PA. **Conclusions:** Overall, low-to-moderate levels of burnout were observed among the PT students who took part. Related factors that contributed to burnout were academic stress, sleeping difficulties, and academic year structure. A normal level of resilience was found to be significantly related to DP and PA but not to EE on the burnout subscales. Higher levels of resilience can be considered to play a protective role against burnout among PT students. *Med Pr Work Health Saf.* 2024;75(4)

Key words: resilience, burnout, emotional exhaustion, depersonalization, personal achievement, physical therapy students

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INTRODUCTION

The burnout phenomenon is a serious psychological syndrome characterized by emotional exhaustion, depersonalization, and reduced personal achievement [1] as a result of exposure to continuous stressors, increased clinical training pressure, in the case of healthcare professionals, and many other contributing factors [2]. It has been demonstrated that burnout among healthcare profession-

als is associated with increased incidences of physical and mental illness, lower levels of empathy, poor delivery of healthcare services, and greater medical errors [2].

Resilience is the ability to recover from or adapt effectively to distressing experiences [3]. It is a dynamic process whereby individuals display positive adaptation despite suffering from significant difficulties [4]. Resilience has been shown to have beneficial effects on health and well-being and to have a protective role

against burnout. More resilient people are better able to cope with the stressful conditions and high workloads that healthcare workers often face [3].

A study conducted among the United States (U.S.) medical students suggests that those who had higher levels of resilience were less likely to experience burnout, stress, and depression [5]. Some studies have referred to resilience resources and described them as protective factors that contribute to mitigating the negative effects of stress, and include positive affect, dispositional optimism, perceived social support, and coping flexibility [6–8]. Therefore, it is important to provide resilience training and help promote healthy coping strategies among healthcare professionals.

There has been recent increasing interest in burnout prevalence among medical students in Saudi Arabia (SA) [9]. Based on the *Maslach Burnout Inventory* (MBI), the prevalence of burnout among medical students in SA was found to be 9.8% [9] and this ranged from 10.0% to 63.4% in a systematic review [10]. Moreover, several studies conducted in SA suggest that the prevalence of burnout among medical students ranged from 13.4% to as high as 81.4% [11–15]. Similarly, another systematic review conducted in 2022 found an estimated burnout rate among medical students in SA of 37.23% [16]. Card [17] had earlier asserted that burnout in physicians and other health professionals is a consequence of both avoidable and unavoidable suffering and that it cannot be treated solely through resilience training for the individual. Further, Smith et al. [18] stated that there were conflicting opinions and research findings on how important resilience is for burnout prevention. This suggests that burnout is a complex challenge to resolve for healthcare professionals.

Studies conducted in Poland [19,20], Italy [21], Spain [22], and the US [23,24] have reported burnout levels among practicing physiotherapists. However, very few studies from other countries focus on burnout in physical therapy (PT) students. According to reports from the United Kingdom (UK) [25] and Spain [26], the prevalence of burnout among PT students was 50% and 7.3%, respectively (although the reported percentages are starkly different). In the context of SA, several studies have focused on the prevalence of burnout among medical [27], dental [28], radiology [29], and respiratory therapy (RT) [2] students, and 1 study investigated the impact of burnout on academic achievement among female students enrolled at Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia, in different health sciences colleges, including Doctor of Physical Therapy (DPT) students in

Health and Rehabilitation Sciences [30]. Further, 1 study from SA involved physical therapists in clinical practice who worked in clinics, but not students [31]. However, there have been no studies on academic burnout among PT students in SA. In addition, it might be interesting to explore whether there is a progressive trend in the prevalence of burnout as PT students move up their academic years, as this could shed light on whether early interventions to prevent such situations are warranted. Therefore, the objectives of this study were:

- to investigate the prevalence of burnout among PT students at King Saud University (KSU),
- to identify the burnout-related factors,
- to investigate resilience levels among the PT students,
- to assess the relationship between burnout and resilience in these students.

Based on the above aims, this study sought to prove the following hypotheses:

- PT students are likely to have high burnout levels,
- burnout is associated with academic stress, sleeping difficulties, and semester structure,
- PT students in SA have low resilience levels,
- resilience is negatively correlated with burnout.

MATERIAL AND METHODS

Study design and settings

A cross-sectional study that employed a self-administered online questionnaire was conducted among students enrolled in the physical therapy department at KSU. The data collection was undertaken over a period of 3 months, from January to March 2023.

Participants, sampling method, recruitment, and data collection

A convenience sampling method was used in this study. Male and female PT students between the ages of 18 and 25 years who were enrolled in the physical therapy program at KSU in SA were sampled. The PT program at KSU includes an initial foundation (preparatory) year and then 4 years of study. The first year (pre-clinical year) involves fundamental science courses related to the PT speciality; the second and third years comprise both theoretical and clinical courses; and the fourth (final) year is the internship period, during which the focus is mainly on the practical application of clinical training. During their internship period of 12 months, PT students work on a rotational basis across different hospitals and settings (inpatient and outpatient), as well as work fulltime in clinics.

Participants were invited to complete an online questionnaire that was distributed via SurveyMonkey (Momentive Inc., San Mateo, CA, USA). The questionnaire's link was sent to student's emails and through social media platforms such as WhatsApp (Meta Platforms Inc., Menlo Park, CA, USA) and X (X Corp., San Francisco, CA, USA). In addition, a questionnaire barcode was created and displayed in classrooms in order to increase the rate of responses. The students were also given instructions on how to proceed if they had concerns or further questions. The questionnaire took around 15–20 min to complete. The data received from the responses were exported to an Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA).

Sample size calculation

The total population of PT students at KSU was then 223, including internship students who were working as physical therapists in different hospitals in Riyadh. Using a web-based sample size calculator [32], 153 students were needed for a confidence level of 90% and a 5% margin of error.

Ethical considerations

The Institutional Review Board approved the study at the College of Medicine at KSU (Ref. No. 22/1030/IRB). An online questionnaire was added with the study purpose, with details about the length of the questionnaire and the main investigator's contact information. The participants' information was kept private, and none of their names or other identifying information was disclosed. Before starting the online questionnaire, participants gave their consent to participate in a consent statement.

Instruments

The survey employed a self-administered questionnaire that included a cover page outlining the study's purpose, the time required to complete the questionnaire, and the confidentiality of the data given. The study questionnaire had 3 sections containing closed-ended questions. The first section contained socio-demographic information, such as age, gender, marital status, living arrangement, cumulative grade point average (GPA), student status, and academic level, followed by the total length of clinical training and number of visits for undergraduate students, and length of clinical training for internship students. Based on the literature review, possible related factors were also measured, including academic stress, cultural background, learning environment, curriculum difficulty, and changing academic semester length [2,9,23].

Burnout

The second section of the survey document contained the MBI self-report questionnaire, which was related to the assessment of burnout prevalence. The MBI contains 22 questions across 3 fundamental elements: 7 questions on *Emotional Exhaustion* (EE), which evaluate feelings of emotional stress and exhaustion; 7 questions on *Depersonalization* (DP), which assess impersonal responses toward patients; and 8 questions on *Personal Achievement* (PA), which evaluate lack of accomplishment in clinical training. Each component is composed of 7 items scored as follows: 0 – “never,” 1 – “a few times per year,” 2 – “once a month,” 3 – “a few times per month,” 4 – “once a week,” 5 – “a few times per week,” and 6 – “every day.” The total score of each component is categorized into a low, moderate, or high score. High scores for EE and DP with low scores for PA show high scores of burnout [33].

The score was calculated using the sum method, by adding together the scores recorded for each component in the MBI questionnaire. This sum method has been used to evaluate the prevalence of burnout and its components (subscales or domains) [2]. High burnout is identified by an EE score ≥ 30 , a DP score ≥ 12 , and a PA score ≤ 33 . Moderate burnout is identified by an EE score of between 18–29, a DP score of 6–11, and a PA score of 34–39. Low burnout is identified by an EE score of ≤ 17 , a DP score of ≤ 5 , and a PA score of ≥ 40 [2,33,34]. The MBI has proven to be a valid and reliable tool. Internal consistency, using Cronbach's coefficient α , is estimated at 0.90 for EE, 0.79 for DP, and 0.71 for PA [33,34].

Resilience

The third section of the questionnaire contained a *Brief Resilience Scale* (BRS) that was based on a previous study by Smith et al. [35] and was related to the measurement of an individual's ability to bounce back from stressful events. The BRS is composed of 6 items with five-point Likert scale responses. Items are scored from 1 to 5, where 1 – “strongly disagree,” 2 – “disagree,” 3 – “neutral,” 4 – “agree,” and 5 – “strongly agree.” Items 1, 3, and 5 are positively worded, and 2, 4, and 6 are negatively worded. To calculate the final score, the values of each of the 6 items are added, and the sum is then divided by the total number of questions (6). A score of 1.00–2.99 indicates low resilience, a score of 3.00–4.30 indicates moderate resilience, and a score of 4.31–5.00 indicates high resilience [2,35]. The BRS has proven to be a valid and reliable instrument (Cronbach's α coefficient = 0.83) [36,37].

Table 1. Demographic data of the physical therapy students at King Saud University, Riyadh, Saudi Arabia (January–March 2023)

Variable	Participants (N = 153) [n (%)]	M±SD	min.–max
Age [years]		21±1.3	18–25
Gender			
male	65 (42.5)		
female	88 (57.5)		
Living arrangement			
living with family	147 (96.1)		
living elsewhere	6 (3.9)		
Cumulative grade point average			
>4.5–5	52 (34.0)		
>4–4.5	46 (30.1)		
>3.5–4	34 (22.2)		
≥3–3.5	15 (9.8)		
≤2.99	6 (3.9)		
Academic year			
first year	51 (33.3)		
second year	45 (29.4)		
third year	34 (22.2)		
internship	23 (15)		
Clinical training			
during undergraduate years [months]			
none	80 (61.5)		
0–3	22 (16.9)		
4–6	19 (14.6)		
7–9	7 (5.4)		
10–12	2 (1.5)		
visits during undergraduate years			
0	65 (50)		
1–3	25 (19.2)		
4–6	14 (10.8)		
7–9	6 (4.6)		
10–12	2 (1.5)		
≥13	18 (13.8)		
during internship year [months]			
0–3	4 (17.4)		
>3–6	7 (30.4)		
>6–9	4 (17.4)		
>9–12	8 (34.8)		

Usability and technical functionality of the online electronic questionnaire

A pilot study was conducted to test the clarity of the methods used and the procedure by distributing the survey to 21 students, and feedback was received to correct any issues. The questionnaire was found to be easy to follow. To prevent multiple entries from the same participant, the students were asked to write the last 4 digits of their university ID.

Statistical analysis

Data analysis was performed using the Statistical Package for Social Studies version 29 (IBM Corp., Armonk, New York, USA). An Excel spreadsheet was used to transfer the online questionnaire data automatically and export them into a statistical analysis program. Descriptive statistics were presented as the frequency and percentage (%) for categorical variables. The continuous variables were presented as the mean (M) ± standard deviation (SD) or the median and range based on data normality. The prevalence of burnout subscales (EE, DP, and PA) between participants based on their demographic variables (e.g., gender, academic year, and GPA) was compared using the χ^2 test. The relationship between resilience and burnout subscales (EE, DP, and PA) was analyzed using the Spearman's rank correlation coefficient. Cohen's rules, which summarize the strength of the relationship between 2 variables, were used to interpret the effect size; 0.1 represents a weak correlation, 0.3 represents a moderate correlation, and ≥ 0.5 indicates a strong correlation [38].

RESULTS

A total of 223 PT students were contacted, including those doing internships, and 153 student questionnaires (a response rate of 68.6%) were returned (Table 1). The M±SD of the students' ages was 21±1.3 years, they ranged from first academic year to internship year students, more than half the study participants (57.5%) were female, and the majority of them (96.1%) lived with their family. Almost one-third of the students (34%) had an excellent GPA (4.5 out of 5), and a small proportion of students (7.2%) were on medication for mental illnesses.

Prevalence of burnout

The study found that the PT students and interns had a low-to-moderate level of burnout, as shown in Table 2. The prevalence of burnout was evaluated using the sum method for the 3 burnout subscales: EE, DP and PA. Par-

ticipants had M±SD scores of 15±11 for EE, 8±7 for DP, and 28±14 for PA. Around 130 (85%) of the participants indicated low-to-moderate levels of burnout in the EE domain, and 116 (75.8%) showed low-to-moderate levels of burnout in the DP domain. However, 86 (56.2%) of participants indicated a high level of burnout in the PA domain.

Prevalence of burnout between participants in relation to demographic variables

The prevalence of burnout levels between participants based on their demographic variables (e.g., gender, academic year, and GPA) was estimated using the χ^2 test. As shown in Table 3, in respect of gender, female PT students had a significantly higher level of burnout, particularly in the EE domain (N = 17, 19.3%) compared to male students (N = 6, 9.2%) ($p = 0.047$). However, there were no significant differences in burnout levels in the other 2 domains (DP and PA) between the 2 genders ($p = 0.178$ and $p = 0.175$, respectively).

In terms of the prevalence of burnout level and academic year (first, second, third, and internship years) in all domains, there was no significant difference in the EE domain ($p = 0.096$). In contrast, for the DP domain, there was a significant difference between academic years and the prevalence of burnout ($p = 0.002$): first- and second-year students showed low levels of burnout (43% and 55%, respectively), whereas third-year and internship students presented moderate levels of burnout (52.9% and 52.2%, respectively). Moreover, for the

Table 2. Data from the *Maslach Burnout Inventory* regarding the prevalence of burnout among physical therapy students at King Saud University, Riyadh, Saudi Arabia (January–March 2023)

Burnout scale	Participants (N = 153) [n (%)]	M±SD	Skewness (SE)	Kurtosis (SE)
<i>Emotional Exhaustion</i>		15±11	0.66 (0.19)	-0.36 (0.39)
low	101 (66)			
moderate	29 (19)			
high	23 (15)			
<i>Depersonalization</i>		8±7	1.53 (0.19)	3.29 (0.39)
low	60 (39.2)			
moderate	56 (36.6)			
high	37 (34.2)			
<i>Personal Achievement</i>		28±14	-0.47 (0.19)	-0.86 (0.39)
low	35 (22.9)			
moderate	32 (20.9)			
high	86 (56.2)			

PA domain, there was a significant difference between academic year and the prevalence of burnout levels ($p < 0.001$), with almost all academic years (first-, second-, and third-year students) reporting being exposed to high levels of burnout (76%, 53.3%, and 47%, respectively); conversely, 52% of internship students had low levels of burnout in the PA domain.

Table 3. Burnout subscales by gender among physical therapy students at King Saud University, Riyadh, Saudi Arabia (January–March 2023)

Burnout scale	Males (N = 65) [n (%)]	M±SD	Females (N = 88) [n (%)]	M±SD	p
<i>Emotional Exhaustion</i>		12±11		18±11	0.047*
low	50 (76.9)		51 (58)		
moderate	9 (13.8)		20 (22.7)		
high	6 (9.2)		17 (19.3)		
<i>Depersonalization</i>		8±8		9±7	0.178
low	31 (47.7)		29 (33)		
moderate	21 (32.3)		35 (39.8)		
high	13 (20)		24 (27.3)		
<i>Personal Achievement</i>		25±15		30±13	0.175
low	13 (20)		22 (25)		
moderate	10 (15.4)		22 (25)		
high	42 (64.6)		44 (50)		

* Statistically significant $p < 0.05$.

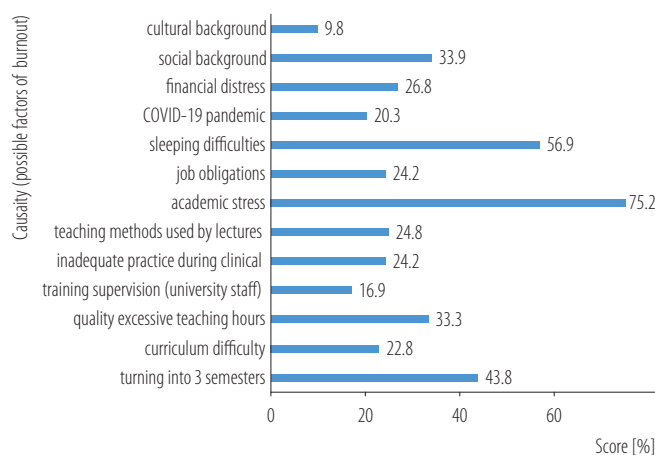


Figure 1. Related factors contributing to burnout among physical therapy students at King Saud University, Riyadh, Saudi Arabia (N = 153) (January–March 2023)

With regard to the prevalence of burnout levels and GPA among the 3 subscales (EE, DP, and PA), there was significant difference between GPA and burnout levels in PA ($p = 0.006$). Around 83.0% of the PT students with a lower GPA (≤ 2.99 out of 5) compared to 46% with a higher GPA (4.5–5 out of 5) showed high levels of burnout in the PA domain but not in the other domains (that is, EE and DP: $p = 0.783$ and $p = 0.656$, respectively).

Factors related to burnout

As shown in Figure 1, the majority of the participants (75.2%) reported that academic stress was one of the most important factors leading to an increase in the prevalence of burnout among PT students, followed by sleeping difficulties (56.9%). Around 43.8% of the participants stated that changing the academic year into 3 semesters could be considered an additional factor leading to burnout. There were also other possible factors contributing to burnout mentioned by the PT students, such as transportation issues, limited time for studying, course order through the academic year, mental stress, self-learning materials, and really big assignments.

Resilience

This study found that the $M \pm SD$ for the resilience domain was 3.14 ± 0.58 , which was revealed to be a moderate resilience level among PT students (including those undergoing internships), as shown in Table 4. Almost one-third of the study participants (31.3%) indicated a low level of resilience, whereas only 3.7% reported high resilience. However, the majority of the PT students (66.0%) reported a moderate resilience level.

Table 4. Resilience level among physical therapy students at King Saud University, Riyadh, Saudi Arabia (January–March 2023)

Resilience level	Participants (N = 153) [n (%)]	M \pm SD	Skewness (SE)	Kurtosis (SE)
Resilience		3.14 \pm 0.58	-0.10 (0.19)	-0.11 (0.39)
low	47 (31.3)			
moderate	99 (66.0)			
high	4 (3.7)			

Resilience level: low 1.00–2.99; moderate 3.0–4.30; high 4.31–5.0.

Relationship between the total score for resilience and burnout subscales (EE, DP, and PA)

The results of this study found that although there was no significant negative relationship between the resilience score and EE ($\rho = -0.113$, $p = 0.165$), there was a significant negative weak relationship between resilience and DP ($\rho = -0.181$, $p = 0.025$) and a positive and moderate relationship between resilience and PA ($\rho = 0.377$, $p < 0.001$).

DISCUSSION

To the best of authors' knowledge, this is the first study to report burnout prevalence and its relationship to resilience among PT students and interns at KSU in SA. This study aimed to investigate the prevalence of burnout and resilience among PT students, explore the related factors that contribute to burnout, and determine the relationship between burnout and resilience. The main findings of this study indicate that a low-to-moderate level of burnout existed among the PT students, including those on internships. The PT students who participated in the study identified that academic stress, followed by sleeping difficulties and changing semester structures were possible factors contributing to increased burnout levels. The majority of the PT students were found to have a moderate level of resilience. Furthermore, there was a negative relationship between the results for 2 of the burnout subscales (EE and DP) and resilience.

Prevalence of burnout

The prevalence of burnout among students reported in the literature review is quite varied, with some of the studies supporting the findings of this study and others reporting contrasting data. For example, in line with the results of this study, a meta-analysis of 12 studies conducted in 2019 reported that the prevalence of

burnout among medical students ranged from 7.0% to 75.2% [10]. Further, a recent study from Spain reported that first-year PT students at a Spanish university had a low prevalence of burnout, i.e., 7.3% [26]. However, a recent study conducted in the UK reported that 50% of PT undergraduate students in the UK had a moderate to high prevalence of academic burnout [25]. This percentage is much higher than that observed in the participants of this study. The difference in the results could be attributable to numerous factors, such as educational structure, cultural changes, and environmental changes [25,26], which were also identified as influential factors in this study. With regard to demographic factors related to burnout, in the present study, it was found that the prevalence of burnout was significantly higher among females than among males. In contrast to the current study observations, March-Amengual et al. [26] found no significant differences between males and females with regard to the prevalence of burnout. A possible reason for this difference may be that all the participants in the March-Amengual et al. study were from the same academic year, while the participants of this study were recruited from all academic years.

This study indicated that there was a low level of burnout among PT students and interns, particularly in the EE and DP domains, and a high level of burnout level in the PA domain. These findings suggest that the PT students were not emotionally exhausted but were unhappy about their clinical accomplishments. This can probably be explained by the majority of the study sample being in pre-clinical years, so their clinical experience was insufficient as yet, causing them to lack confidence and to be dissatisfied about their clinical work. This study findings are in line with a previous study, conducted at Princess Nourah bint Abdulrahman University, which investigated levels of burnout and its association with academic achievement among College of Health and Rehabilitation Sciences students [30]. That study found that 77 out of the 104 (74%) participants showed no signs of burnout, while 3 out of the 104 had high levels of burnout (2.9%) [30]. On the other hand, a study conducted among RT students in SA found a high level of burnout, with about 95% of RT students reporting moderate-to-high burnout levels [2]. These contrasting results may be due to differences in the curriculum structures and strengths between the universities, as each university has varying workloads and frequency of assessment. Another possible explanation for this result is that the data collection

time was near the beginning of the academic semester, with lower academic pressure compared to the middle and end of the semester.

Prevalence of burnout according to demographic variables

With regard to the prevalence of burnout and the gender variable, it was found that female students had significantly higher levels of EE and DP than males but not PA. This is in line with a previous study carried out among medical students at KSU, in which burnout was prevalent in 9.8% of the participants, 25.5% of subjects had high levels of EE, 29.4% had high levels of DP, and 34.4% had low levels of PA; EE and DP in females were higher than in male students, whereas PA was lower than in male students [9]. In contrast, this finding is not in line with other previous studies. For example, one study among RT students in Saudi Arabia found that male students had a higher level of burnout compared to females, although this did not reach the level of statistical significance [2]. Another study, conducted among Malaysian medical students, found that male students had higher burnout levels compared to females [39]. One possible reason for these contrasting results could be the larger number of male students (N = 279, 50%) [2] compared to the proportion of the male participants (N = 65, 42%). Another possible reason may be that their students were more proficient in clinical training than the students in this study. It was also assumed that male students, especially at an academically advanced level, think about their future careers more than female students.

This study found that there was no significant difference between burnout levels in the EE domain and academic year, which is in line with another previous study [33]. However, the first- and second-year students showed low levels of burnout in DP, whereas third-year students and interns showed moderate levels of burnout. This is in contrast to another study, which surveyed 163 DPT students from the first and second years at Northern Arizona University and showed a significant increase in exhaustion and disengagement in the students in both years, with second-year students exhibiting higher levels of exhaustion and disengagement than first-year students [40].

This study revealed no significant differences between the academic years (first, second, and third) that showed a high level of burnout in the PA domain, which is similar to another study [23]; however, the intern students indicated a low level of burnout in the

PA domain. This finding is in contrast with a study by Siraj et al. [2], which found that those in higher academic years (fourth years and interns) had significantly higher burnout levels in all burnout domains (EE, DP, and PA) ($p < 0.05$) compared to those in lower academic years (first, second, and third) among RT students. A possible explanation for this contrasting result may be that the majority of students in this study were from the first 2 basic academic years (first and second) and were emotionally exhausted from their lectures, assignments, examinations, and clinical training and increased pressure, resulting in higher burnout compared to interns, who mainly spent their working hours in clinical training and were becoming more mentally relaxed.

The prevalence of burnout according to the subscales was analyzed in relation to GPA in this study and it was found that there was a significant correlation between GPA and burnout levels in the PA domain only. A lower GPA obtained a high level of burnout in the PA domain but not in relation to EE and DP. This is contrary to other previous studies that found that students with high GPAs had higher burnout levels compared to students with lower GPAs [2,39]. One reason for this could be program structure and educational strategies, and another possible justification is that having an excellent GPA puts students under pressure physically and mentally, resulting in a high burnout level.

Factors related to burnout

Factors producing burnout are numerous and difficult to categorize among students. This study indicated that there were crucial factors that increase burnout levels among PT students, which include academic stress, sleeping difficulties, and changing from 2 academic semesters to 3 per academic year, in addition to other factors that could be considered.

In this study, it was identified that academic stress was the most important factor leading to increased burnout levels among students. This is in line with other studies [2,41] which reported that burnout levels were related to various factors, such as academic pressure to attain good grades, memorizing and studying in a short amount of time, difficult examination procedures, and a high number of assignments. Furthermore, Bullock et al. [42] suggest that the incidence of burnout rises as healthcare students' progress to the graduation year. Another study revealed that the final years of study programs were particularly stressful as a result of the shift from pre-clinical to clinical study [43].

A previous study revealed that, over a semester, the percentage of students in the burnout category increased by 22%, showing moderate levels of emotional exhaustion at the beginning of the semester which increased to higher levels later in the middle and late semester. On the other hand, DP rates increased from the beginning of the semester to the middle and end, although these changes did not reach statistical significance [44]. One possible explanation for these results could be that generally, as the semester progresses, workloads increase, and deadlines for examinations and projects contribute to significant pressure among students.

Moreover, other previous studies have suggested that environmental factors could increase burnout levels, such as grading schemes and students' perception of the learning environment. It was also suggested that there were other, individual factors, including decreased levels of physical activity, low levels of social support, lack of positive life events, increased fatigue and stress, and reduced resilience [5,45–48].

Furthermore, Boni et al. [49] found that students with illness, or who were unmotivated or deprived of regular nights of sleep due to their rigorous routine, were more likely to exhibit high levels of burnout. These results are in line with the study findings, as sleeping difficulties were reported as an important factor in developing burnout. Bullock et al. [42] also concluded that students who experienced burnout were more likely to engage in inappropriate activity, such as self-prescribing medicine, and that their quality of life was negatively impacted in terms of academic performance and mental health.

Recently, mental health issues have received increased attention in academic settings for their importance in maintaining psychological well-being. In addition to professional education, it is critical to investigate the factors that enable students to maintain their quality of life during their years of training [50]. An earlier study examining burnout in DPT students found that perceived stress, resilience, contentment with faculty assistance, and satisfaction with the learning environment could all have an impact on the development of burnout [18]. In addition to perceived stress, higher positive emotions and greater coping flexibility were all found to be significant independent predictors of resilience [51]. This study identified that 7.2% of the students were receiving treatment for mental illness during their programs. These students must be supported to improve their mental well-being and to prevent the deteriora-

tion in mental health that can occur as a result of burnout and stress.

Based on all the studies discussed above, the underlying mechanisms of burnout among PT students can be summarized as increased stress related to academics and clinical work, lack of support and appropriate mentorship, the pursuit of perfectionism, personal issues, inability to balance academic/work and personal life, and lack of social support. Gaining an in-depth understanding of these mechanisms is crucial for the development of effective interventions, the well-being of students, and ensuring an optimal learning experience.

Resilience and its association with burnout

According to a study of the prevalence of burnout and resilience among RT students [2], 66% of the students reported moderate resilience levels, 32% had low resilience levels, and only a small proportion of participants referred to high levels of resilience. Similarly, this study found that the majority of students indicated moderate resilience levels (66%), with 31% of students reporting low resilience levels, and a handful of students recording high resilience levels (3%). This suggests that, generally, students tend to have average levels of resilience, and only a few of the participants demonstrated a high level of resilience.

Furthermore, the study carried out by Siraj et al. [2] showed a significant association between resilience and all 3 domains of burnout: EE ($\rho = -0.41$, $p < 0.001$), DP ($\rho = -0.32$, $p = 0.03$), and PA ($\rho = 0.46$, $p < 0.001$). However, in this study findings, there was only a significant correlation between the 2 burnout domains: a significant and negative correlation between resilience and DP ($\rho = -0.181$, $p = 0.025$), and a significant and positive correlation between resilience and PA ($\rho = 0.377$, $p < 0.001$). Given these findings, it is demonstrable that there is a link between burnout and resilience levels, although levels of PA can vary depending on the sample of students included. This may mean that burnout can have greater effects on achievement in different people, with some individuals still being able to succeed despite suffering from burnout.

The factors associated with resilience were not examined in this study. In the future, delving into the underlying mechanisms of resilience would be useful for the development of effective interventions to protect individuals from burnout. Some of these strategies include promoting positive psychology methods, such as mindfulness training and social support programs, and teaching adaptive coping strategies and self-com-

passion. Such programs could better equip individuals to cope with the demands of life and work. Importantly, they may be effective for preventing burnout among students with a history of mental health issues, given the observed link between higher resilience levels and lower levels of reported burnout in this study.

Limitations and strengths of the study

A strength of this study is that it is the first to be conducted among PT students in KSU and one of only a few studies of its kind performed in SA measuring burnout and resilience among this population. However, this study has some limitations that should be considered. Firstly, the study was carried out in only 1 university in SA, which makes it difficult to extrapolate the results to other regions of the country. Secondly, the study assessment measures were dependent on a self-reporting questionnaire, and the subjective nature of the measures may have impacted the accuracy of the results. Thirdly, the convenience sampling method was used, and this may have affected the representativeness of the study population and the generalizability of the findings.

Future prospects

In the future, research using objective measures is recommended to improve the methodological strength and to obtain more accurate results. Further research also needs to focus on examining the longitudinal trajectory of burnout among PT students across various regions of SA and to assess the effectiveness of resilience interventions among PT students. Understanding other factors that may influence the prevalence of burnout and resilience levels, such as psychological distress, social support, and adaptive coping strategies, should also be considered in future research.

CONCLUSIONS

This study found, overall, low-to-moderate levels of burnout in PT students at KSU. Those who did experience burnout attributed this to several factors, including academic stress, sleeping difficulties, and a change in semester structure. These factors are commonly cited in the literature as contributors to the development of burnout. A moderate resilience level was found among the majority of study participants. There was a significant correlation between resilience and 2 domains of burnout (DP and PA), which suggests that higher levels of resilience can protect against the development of burnout in individuals.

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