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Seeking greener pastures: attitudes towards brain drain among turkish medical students

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Abstract

Background Medical brain drain is a critical issue for healthcare systems worldwide. This study investigated attitudes toward brain drain and influencing factors among medical students at Pamukkale University.

Methods A cross-sectional study was conducted with 1,129 students (80.8% response rate) during the 2021–2022 academic year. Data, including sociodemographics, views on studying/working abroad, and the 16-item Brain Drain Attitude Scale (BDAS), were collected via a structured online questionnaire. Descriptive statistics, the Mann–Whitney U test, the Kruskal–Wallis test, and multiple linear regression were used for analysis.

Results Over half (52.9%) of the students desired to work abroad, motivated by better working conditions (73.7%), higher salaries (57.8%), and social living conditions (66.8%). The BDAS score (mean = 61.26) indicated a moderate tendency toward brain drain. Key factors associated with higher brain drain attitude scores included financial constraints (B = 0.389, $p = 0.001$), independent living (B = 0.296, $p < 0.001$), initial reluctance to attend medical school (B = 0.598, $p < 0.001$), having friends or relatives abroad (B = 0.347, $p < 0.001$), considering exchange programs (B = 1.004, $p < 0.001$), and moderate foreign language proficiency (B = 0.300, $p < 0.001$).

Conclusion A significant portion of Turkish medical students expressed a desire to work abroad, driven primarily by better working conditions, social living conditions, higher salaries, and excessive workloads in Türkiye. Financial constraints, independent living, dissatisfaction with medical school choices, and social networks with international experiences emerged as significant factors influencing attitudes toward brain drain.

Keywords Brain drain, medical students, attitudes, Türkiye

Background

According to UNESCO, brain drain is defined as "an abnormal form of scientific exchange between countries, characterized by a one-way flow in favor of the most highly developed countries" [1]. Brain drain refers mostly to the migration of skilled workers, such as scientists, doctors, and engineers, to another country to conduct research or work. The brain drain decision is the result of the interaction of many identified factors of both the home and host countries. These factors are generally categorized as "push factors" that push people to leave their home countries and "pull factors" that attract them to their preferred countries [2]. The primary motivators for brain drain differ across countries, as does their relative importance. "Push factors" include low salaries, unemployment, human rights violations, political instability, perceived poor governance, lack of research opportunities, corruption, limited educational opportunities, and poor quality of life [2–4]. On the other hand, "pull" factors that encourage brain drain are those that are absent

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in home countries but are readily available and attainable in host countries. The most important push factors are higher salaries, better chances for one's career, better research opportunities, a modern education system, intellectual freedom, and better working conditions [2–4].

"Medical brain drain" refers to the mass migration of educated and skilled health professionals (doctors, nurses, midwives, etc.) from low-income countries to high-income countries [5]. In recent years, medical brain drain has emerged as a critical challenge for the healthcare sector and is recognized as a potential threat or crisis [6]. According to the World Health Organization (WHO), there may be a gap of 10 million healthcare professionals by the year 2030, primarily in low- and lower-middle-income countries [7]. This phenomenon has a profound impact on healthcare systems, resulting in a scarcity of qualified medical practitioners that directly impairs the quality and accessibility of healthcare delivery. This trend weakens healthcare systems, fostering workforce shortages, prolonged patient wait times, and, ultimately, compromised access to quality care, particularly among vulnerable populations, particularly in resource-limited regions [8, 9].

Recent global data highlights the severity of brain drain. For instance, the Brain Drain Index for 2024 shows that countries like Samoa, Jamaica, and Palestine have the highest brain drain rates. In contrast, countries like Australia, Sweden, and Norway have the lowest rates [10]. Recent research across multiple countries has highlighted a consistent inclination among medical students and physicians toward migration. A study among medical students in Ireland revealed that approximately four out of five students intended to migrate abroad [9]. Similarly, research conducted among medical students and physicians in Pakistan indicated that 60.4% expressed a desire to work in developed countries [8]. Studies involving medical students in Ethiopia, the Democratic Republic of Congo, Kenya, and Nigeria revealed that 40–60% of medical students considered migration [11, 12]. These findings highlight a concerning trend of potential workforce loss, especially in resource-limited regions.

Data from the Turkish Medical Association (TMA) reveal a significant increase in physician emigration from Türkiye. The Good Standing Certificate, a prerequisite for practicing medicine abroad, received a modest number of applications in the early 2010s, with only 59 in 2012. However, this number has dramatically increased over the next decade, culminating in 2685 applications in 2022. By 2023, the number of applications increased further to 3025, marking the highest recorded figure to date. This trend underscores a significant shift in the professional aspirations of Turkish medical practitioners over the past ten years [13, 14]. Given the growing trend of medical brain drain in Türkiye, determining the attitudes of medical students toward brain drain is important, as it will guide the measures taken in this regard. This study aimed to evaluate the attitudes of Pamukkale University Faculty of Medicine students toward brain drain, examining the factors influencing these attitudes. By identifying these factors, we hope to contribute to targeted strategies that address medical brain drain among future healthcare professionals in Türkiye.

Methods

Study design

This study employed a cross-sectional design to capture the attitudes of Pamukkale University Medical Faculty students toward brain drain at a specific point in time during the 2021–2022 academic year. This design was selected to allow for an efficient examination of the associations between socio-demographic factors and attitudes toward brain drain.

Population and Sample

The population consisted of all students enrolled in the Faculty of Medicine at Pamukkale University located in Denizli, Türkiye, during the 2021–2022 academic year. The total population consisted of 1,463 students, including 66 foreign students. The remaining 1,397 domestic students were included in the study. A nonrandom sampling method was utilized, aiming to reach the entire population. Inclusion criteria for this study were defined as follows: (I) being enrolled as a domestic student in the Faculty of Medicine at Pamukkale University during the 2021–2022 academic year, (II) holding Turkish citizenship, and (III) providing informed consent to participate in the study. Foreign students were excluded from the study to enhance internal validity, as their experiences and perspectives regarding migration are likely distinct from those of domestic students. By excluding this subgroup, we aimed to achieve a more homogenous sample that accurately reflects the attitudes and influencing factors relevant to Turkish medical students.

Data collection

The research was conducted at Pamukkale University's Faculty of Medicine between October 6 and October 29, 2021.

Data collection instrument

A structured questionnaire, developed through a comprehensive literature review, served as the primary data collection tool. A 37-question survey form was administered and created through a literature review (Supplementary File 1). The survey was conducted online via Google Forms. The class representatives shared the survey link via student WhatsApp groups at least three times

at different times of the day. The questionnaire consisted of 8 questions on sociodemographic characteristics such as age, gender, class, income level, parents' education level, and academic performance (GPA); 13 questions on students' views and experiences related to studying or working abroad; and the 16-item Brain Drain Attitude Scale (BDAS). The dependent variable was the attitude score toward brain drain among medical students. The BDAS, developed and validated by Öncü et al., consists of 16 items rated on a 5-point Likert scale (1=strongly disagree … 5=strongly agree) [15]. The scale is unidimensional with two components: "push factors" that capture negative aspects of the domestic environment that could motivate brain drain and "pull factors" reflecting positive aspects of potential foreign destinations that could attract individuals to emigrate. The push factor subscale includes items 7, 9, 11, and 13, and the pull factor subscale includes items 1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 15, and 16. Items 3 and 15 are reverse coded. The total score ranges from a minimum of 16 to a maximum of 80, with higher scores indicating a greater tendency toward brain drain. The Cronbach's alpha coefficient was 0.91 in the original study and 0.93 in our study.

Table 1 Sociodemographic characteristics of the students

Variable	*n*	%
Total	1129	100
Gender		
Female	615	54.5
Male	514	45.5
Academic Year		
1st year	223	19.8
2nd year	175	15.5
3rd year	202	17.9
4th year	164	14.5
5th year	185	16.4
6th year	180	15.9
Mother's Education Level		
Illiterate	22	1.9
Literate	24	2.1
Primary School Graduate	265	23.5
Middle School Graduate	118	10.5
High School Graduate	260	23.0
College/University Graduate	440	39.0
Father's Education Level		
Illiterate	2	0.2
Literate	16	1.4
Primary School Graduate	166	14.7
Middle School Graduate	80	7.1
High School Graduate	232	20.5
College/University Graduate	633	56.1
Residence		
With Family	262	23.2
State Dormitory	126	11.2
Private Dormitory	79	7.0
Apartment/House with Friends	144	12.7
Apartment/House Alone	509	45.1
With Relatives	9	0.8
Family Income Status		
Not enough and have debt	135	12.0
Not enough and no debt	100	8.8
Enough and no savings	515	45.6
Enough and have savings	379	33.6
Willingness to Choose Medical School		
Yes	861	76.3
No	84	7.4
Unsure	184	16.3
GPA (Mean ± SD)*	79.80 ± 6.08	
GPA Category*		
< 70 and below	75	9.2
≥Above 70	737	90.8

Statistical analysis

The data were analyzed via SPSS version 29.0. Descriptive statistics are presented as counts, percentages, means, medians, standard deviations, and 25th and 75th percentiles. The normality of the data distribution was tested via the Kolmogorov–Smirnov test. For nonparametric data, Mann–Whitney U or Kruskal–Wallis tests were used to compare variables across groups. Linear regression analysis was employed to identify factors associated with attitudes toward brain drain. A p value of less than 0.05 was considered statistically significant.

Ethical considerations

The study protocol was approved by the Pamukkale University Non-Interventional Clinical Research Ethics Committee [approval date: 05/10/2021 and approval number:18] and conducted in accordance with the principles outlined in the Declaration of Helsinki. Online written informed consent was obtained from all participants before their inclusion in the study.

Results

Sociodemographic characteristics

A total of 1,129 students participated in the study, representing 80.8% of the target population (n=1,397). The response rates for each academic year varied, with the highest percentage of 1st-year students (90.6%) and the lowest percentage of 4th-year students (71.6%). The mean age of the students was 21.13 years (SD=2.14), and the majority of the participants were female (54.5%). The sociodemographic characteristics of the participants, including factors such as academic year, age, gender, parental education level, and family income, etc. are summarized in Table 1.

Motivations for brain drain

The majority of the students (52.9%) expressed a desire to work abroad at some point in their careers. The most common reasons for considering work abroad were better working conditions (73.7%), social living conditions abroad (66.8%), excessive workload (65.1%), and the prospect of higher salaries abroad (57.8%). Political reasons were noted by 35.2% of the respondents, and proximity to major science centers and better conditions for specialization training abroad were factors for 32.6% and 29.6%, respectively. A total of 5.7% cited the unavailability of their desired specialty in Türkiye, and 3.9% mentioned mandatory military service as a reason.

Nearly half of the students (46.9%) had family members or relatives living abroad, 34.9% had friends living abroad, and 41.2% knew someone who had migrated abroad, indicating a significant network effect. Approximately a quarter (24.7%) of the respondents had previous experience abroad. The main purpose of these travels was tourism (20.5%), followed by education (6.5%). A small percentage (4.6%) have participated in international student exchange programs. However, a substantial number (46.1%) are considering participation, reflecting a strong interest in international experiences. The majority of the students were proficient in at least one foreign language, with English being the most common (88.8%). The proficiency level in the best-known foreign language is mostly intermediate (51.9%), with 28.2% rating themselves as good and 7.8% as very good. Table 2 summarizes the students' views and characteristics related to brain drain.

Brain drain attitudes scale (BDAS) scores

The study assessed students' attitudes toward brain drain via both pull and push BDAS factors. The results are summarized in Table 3. The overall mean score on the Brain Drain Attitude Scale was 61.26 (SD = 11.82), with a median score of 62.0. For the pull factors, the mean score was 44.27 ± 8.96, with a median of 44.0. The push factors had a mean score of 16.98 ± 3.47, with a median of 18.0.

Factors Influencing Attitudes Toward Brain Drain: Regression Analysis Results

Multiple linear regression analysis was performed to identify the factors influencing students' attitudes toward brain drain. The results of this analysis are detailed in Table 4. Financial constraints emerged as a significant factor, with students from families with insufficient income and debt having significantly higher attitudes toward brain drain (B = 0.389, $p = 0.001$). Students from families with insufficient income but no debt also had higher scores (B = 0.341, $p = 0.012$), suggesting that financial constraints may contribute to a greater inclination toward brain drain. Independent living arrangements were associated with higher brain drain attitudes. Compared with those living with family or relatives, students living alone or with friends in a house/apartment had higher attitude scores (B = 0.296, $p < 0.001$), which could indicate that students who are more independent are also more open to the idea of brain drain. Personal dissatisfaction with medical school selection was associated with higher brain drain attitudes. Students who did not originally desire to attend medical school had significantly higher brain drain attitudes (B = 0.598, $p < 0.001$), which implies that dissatisfaction with their current educational choices may drive students to consider opportunities abroad. Having friends or relatives who experience brain drain was associated with higher brain drain attitudes (B = 0.347, $p < 0.001$), and one's personal networks and experiences with others can influence one's own attitudes toward migration. Students with intentions to participate in international exchange programs showed the highest levels of brain drain attitudes (B = 1.004, $p < 0.001$), which indicates that exposure to international environments may enhance the desire to work abroad. Those who were undecided about participating in exchange programs also had higher scores (B = 0.457, $p < 0.001$). Compared with those with very poor or poor proficiency, students with moderate proficiency in a foreign language had higher brain drain attitudes (B = 0.300, $p < 0.001$), which could reflect the role of language skills in facilitating international mobility.

Discussion

The present study aimed to explore the attitudes of medical school students toward brain drain and the factors influencing this phenomenon. Our findings highlight the complex interplay between individual, familial, and socioeconomic factors that shape medical students' propensity to consider migration for professional opportunities abroad. Our study revealed that 52.9% of medical students expressed a desire to work abroad, a finding that underscores the ongoing issue of brain drain in the medical field. This aligns with previous research conducted in various countries, including Nepal (40.3%), Iraq (42.1%), Uganda (44.6%), Ethiopia (53.0%), India (59.0%), and Pakistan (60.4%) [16–21]. These figures indicate a global pattern in which medical students in developing countries are inclined toward migration. However, notable differences exist. For example, the extremely high rates of brain drain intention in Egypt (89.6%), Ireland (88%), and Romania (84.7%) suggest that significant disparities exist, possibly due to variations in domestic healthcare policies, socioeconomic conditions, and educational opportunities [9, 22, 23]. The Brain Drain Attitude Scale (BDAS) scores provided further insights. The overall mean score (61.26) suggests a moderate susceptibility to brain drain among the studied population, reflecting a generally positive attitude toward emigration. Interestingly, pull

Table 2 Students' views and characteristics related to brain drain

Variable	*n*	%
Desire to Work Abroad After Graduation		
Definitely Yes	227	20.1
Yes	370	32.8
Unsure	344	30.5
No	166	14.7
Definitely No	22	1.9
Reasons for Considering Work Abroad*		
Working conditions abroad	693	73.7
Social life conditions abroad	628	66.8
Excessive workload in Türkiye	612	65.1
High salary opportunities abroad	543	57.8
Political reasons	331	35.2
Proximity to major scientific centers	306	32.6
Specialization training conditions abroad	278	29.6
Unavailability of desired specialization in Türkiye	54	5.7
Compulsory military service (male students only)	37	3.9
Other	18	1.9
Having Family Members/Relatives Living Abroad		
Yes	529	46.9
No	600	53.1
Having Friends Living Abroad		
Yes	394	34.9
No	735	65.1
Having Friends/Relatives Who Brain Drain		
Yes	465	41.2
No	664	58.8
Previous Experience Abroad		
Yes	279	24.7
No	850	75.3
Purpose of Going Abroad*		
Tourism	232	20.5
Education	73	6.5
Work	7	0.6
Healthcare	1	0.1
Business	2	0.7
Other	17	6.1
Participation in Student Exchange Programs		
Yes	52	4.6
No	1077	95.4
Consideration of Participating in Student Exchange Programs		
Yes	521	46.1
No	324	28.7
Unsure	284	25.2
Known Foreign Languages*		
I do not know any foreign languages	122	10.8
English	1002	88.8
German	165	14.6
Spanish	15	1.3
Russian	4	0.4
Arabic	11	1.0
French	9	0.8
Other	7	0.6
Level of Proficiency in The Best-Known Foreign Language		

Table 2 (continued)

Variable	*n*	%
Desire to Work Abroad After Graduation		
Very good	88	7.8
Good	318	28.2
Intermediate	586	51.9
Poor	110	9.7
Very poor	27	2.4

Table 3 Students' scores on the brain drain attitude scale (BDAS)

Scale	Mean ± SD	Median	Min–Max	1st-3rd Quartile
Total BDAS Scale	61.26 ± 11.82	62.0	16.0–80.0	54.0–71.0
Pull Factors	44.27 ± 8.96	44.0	12.0–60.0	39.0–51.0
Push Factors	16.98 ± 3.47	18.0	4.0–20.0	16.0–20.0

factors (mean score: 44.27), representing the attractiveness of working abroad, were higher than push factors (mean score: 16.98), reflecting dissatisfaction with the domestic system. This disparity underscores the students' strong attraction to pull factors such as better working conditions (73.7%), social living conditions (66.8%), and higher salaries (57.8%). While push factors such as excessive workload (65.1%) and limited opportunities for specialization (29.6%) are present, they appear to be less influential than pull factors. These findings are in line with other studies [9, 22, 23] and suggest that for this student population, the primary driver of brain drain is international opportunities. The prospects of better salaries, advanced infrastructure, and potentially less workload outweigh current dissatisfactions with the domestic healthcare system. The long-term effects of brain drain on Türkiye's healthcare system could be profound particularly in rural and underserved areas. The loss of skilled healthcare professionals can lead to a shortage of medical staff, which may result in increased workloads for the remaining practitioners, longer patient wait times, and potentially lower quality of care. This scenario has been observed in countries like India and Pakistan, where significant brain drain has exacerbated existing healthcare challenges [24, 25]. Besides, in Iraq, the quality of healthcare, staffing levels, and safety for doctors deteriorated significantly between 2003 and 2006, leading to mass migration of doctors and a critical shortage of qualified healthcare workers. This has resulted in a mass exodus of doctors and a critical shortage of qualified healthcare workers in Iraq [26]. The Iraqi health system is now grappling with challenges such as restoring severely damaged infrastructure, rebuilding administrative and support systems, and replacing lost human capital. If brain drain continues, Türkiye may encounter similar challenges, where recruiting and retaining skilled practitioners become increasingly difficult. Addressing these impacts will likely require multifaceted strategies, such as improving working conditions, offering financial

Table 4 Multiple linear regression analysis results for factors affecting brain drain attitude scores

Variable	B	Standard Error	Beta	*p* value	95% Confidence Interval
Family Income Level					
Enough and have savings (reference)					
Not enough and have debt	0.389	0.119	0.091	0.001	0.156–0.622
Not enough and no debt	0.341	0.136	0.070	0.012	0.075–0.607
Residence					
With family/relatives (reference)					
Alone or with friends	0.296	0.078	0.105	< 0.001	0.142–0.449
Desire to Attend Medical School					
Yes (reference)					
No	0.598	0.146	0.113	< 0.001	0.312–0.885
Has Friends/Relatives Who Migrated					
No (reference)					
Yes	0.347	0.078	0.123	< 0.001	0.194–0.501
Considering Participation in Exchange Programs					
No (reference)					
Yes	1.004	0.091	0.360	< 0.001	0.825–1.183
Undecided	0.457	0.104	0.142	< 0.001	0.253–0.660
Best Known Foreign Language Level					
Very Poor-Poor (reference)					
Moderate	0.300	0.081	0.104	< 0.001	0.141–0.460

*A backward linear regression analysis was performed, including variables such as gender, class, family income level, residence, desire to attend medical school, presence of friends living abroad, presence of friends/relatives who migrated, participation in exchange programs, consideration of participation in exchange programs, and best-known foreign language level. (Adjusted R^2 of the model: 0.168)

incentives, and investing in healthcare infrastructure to retain talent locally.

Our study employed multiple linear regression analysis to identify key factors influencing medical students' attitudes toward brain drain, and financial constraints significantly influence students' attitudes toward brain drain. Students from families with insufficient income and debt burdens scored significantly higher on brain drain attitudes than their financially secure peers did. This parallels the national driver of remuneration highlighted in other studies, where economic incentives are a major factor pushing health workers to migrate [8, 23, 27, 28]. Financial hardships likely enhance the appeal of better-paying opportunities abroad. This suggests that addressing the financial barriers faced by medical students could be an important strategy to mitigate brain drain, as improving their sense of financial security may reduce the perceived need to seek opportunities abroad.

Students living alone or with friends had higher attitude scores, suggesting that independence is associated with greater openness to migration. This could be related to the role of social belonging in influencing migration decisions [17, 18, 20, 27, 28], with stronger personal and family ties in the home country acting as a deterrent, where independent living may foster a mindset more attuned to seeking opportunities abroad. Interventions aimed at strengthening social support networks for medical students may help foster a sense of belonging and commitment to their home countries, thereby reducing the inclination toward brain drain.

Interestingly, students who did not initially aspire to attend medical school showed a greater tendency toward brain drain. Dissatisfaction with their current educational choices may drive these students to pursue opportunities abroad, where they believe that they can achieve greater professional advancement and fulfillment. Previous research underscores this trend, highlighting limited career prospects and poor research opportunities at home as key motivators for migration [9, 28–30]. Additionally, social networks also play a part. Students with friends or relatives who had previously migrated displayed a greater inclination toward brain drain. This is consistent with the established influence of social networks on migration decisions, with the potential for "chain migration" within healthcare professions and the role of a "culture of migration" and social pressure [29, 31]. Social networks and exposure to positive experiences of others abroad likely amplify the attractiveness of migration and can influence individual perceptions and aspirations.

Participation in exchange programs was the strongest predictor of brain drain attitudes. This finding resonates with other studies' findings that exposure to international environments enhances migration intentions [4, 28, 32]. Students with international experience are likely more aware of and attracted to opportunities abroad. This underscores the need to carefully design and implement such programs in a way that encourages students to return to their home countries after gaining international experience rather than incentivizing permanent migration.

Language proficiency emerged as another contributing factor. Compared with those with limited proficiency, students with moderate foreign language skills had higher brain drain scores. This finding indicates that language skills, which are essential for navigating international healthcare systems and for international mobility, can bolster the feasibility and attractiveness of working abroad. This finding is consistent with prior studies that showed that language barriers are a significant inhibitor of migration [29, 33].

Our study has several limitations and strengths. Although the study aimed to reach the entire population, the use of a nonrandom sampling method may introduce selection bias. We conducted the survey online via Google Forms, which may introduce response bias. Students who were more interested in the topic or more likely to check WhatsApp groups may have been overrepresented. However, our study achieved a high response rate of 80.8%, minimizing nonresponse bias and providing a strong representation of the target population. The Brain Drain Attitude Scale (BDAS) used in the study is a validated instrument with a high Cronbach's alpha coefficient (0.93 in this study), indicating strong internal consistency and reliability of the measurement tool. The study relies on self-reported data (e.g., GPA, language proficiency, attitudes), which can be susceptible to social desirability bias and recall bias, and participants may not accurately report their motivations or experiences. Additionally, the cross-sectional study design limits the ability to infer causality or examine changes in attitudes over time. Longitudinal studies would be more informative in understanding trends and long-term factors influencing brain drain.

Conclusion

This study revealed that a significant portion of the students expressed a desire to work abroad, driven primarily by better working and social conditions, higher salaries, and excessive workloads in Türkiye. Financial constraints, living independently, a lack of initial desire for medical school, and social networks with international experiences emerged as significant factors associated with a stronger inclination toward brain drain. These findings suggest that targeted policies addressing financial and social factors may reduce brain drain inclinations among medical students. Our findings have several important implications for policymakers and

educational institutions and underscore the need for systemic improvements in Türkiye to retain medical talent. First, addressing financial constraints faced by medical students could be a crucial strategy to mitigate brain drain. Programs offering scholarships, loan repayments, or financial aid packages targeted toward medical students from lower-income backgrounds may mitigate the push factors associated with financial hardship. Second, improving working conditions and opportunities for specialization within the country could help retain talent. Policymakers and educators can create a more attractive environment for medical professionals in Türkiye by improving working conditions for medical professionals to reduce push factors. This includes addressing excessive workloads, ensuring competitive salaries, and enhancing overall job satisfaction. Enhancing the infrastructure and resources available in domestic healthcare settings may make local opportunities more attractive. Finally, fostering a supportive environment for professional growth and development, including opportunities for international collaboration and exchange programs, could help balance the desire for international experience with the need to retain skilled professionals within the country.

Additionally, qualitative research exploring the motivations and experiences of students considering or pursuing work abroad can provide deeper insights. Furthermore, longitudinal studies are needed to track changes in brain drain attitudes over time and assess the long-term impact of interventions aimed at reducing brain drain. This will provide deeper insights into the effectiveness of various strategies and inform future policy decisions.

Abbreviations

BDAS	Brain Drain Attitude Scale
GPA	Grade point average
SD	Standard deviation
TMA	Turkish Medical Association
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-024-06511-x.

Supplementary Material 1

Author contributions

All the authors contributed to the study conception and design. Material preparation and data collection were performed by SUU, BBK. The analyses were performed by SUU and BBK. The first draft of the manuscript was written by SUU, and all the authors commented on previous versions of the manuscript. All the authors read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was reviewed by the Pamukkale University Noninterventional Clinical Research Ethics Committee [approval date: 05/10/2021; approval number: 18]. Before data collection, all study participants were informed about the purpose of the study and the rights to participate or decline to participate in the study. The respondents were also informed about the confidentiality of their information and assured that all the data would be used only for research purposes. Prior to administering the questionnaires, all the participants signed an online consent form.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Clinical trial number

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