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**Health status and healthcare-seeking behaviour of medical students in the
view of acculturation in Hungary**

PhD Thesis

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List of Publications

Publications related to the thesis:

- I. **Umami, A.**, Paulik, E., Molnár, R. International medical students' acculturation and self-rated health status in Hungary: a cross-sectional study. *BMC Public Health* 22, 1941 (2022). <https://doi.org/10.1186/s12889-022-14334-y>

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- II. **Umami, A.**, Zsiros, V., Maróti-Nagy, Á., Máté, Zs., Sudalhar, S., Paulik, E., Molnár, R. Healthcare-seeking of medical students: the effect of socio-demographic factors, health behaviour and health status – a cross-sectional study in Hungary. *BMC Public Health* 23, 2126 (2023). <https://doi.org/10.1186/s12889-023-17041-4>

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1. **Umami, A.**, Munawaroh, S. M., Paulik, E., Molnár, R. Acculturation among international medical students. NKE Conference XV, Hungary. August 2022. *Népegészségügy*, 99: 233-233. P/6, 1 p. (2022)
2. **Umami, A.**, Zsiros, V., Maróti-Nagy, Á., Máté, Zs., Molnár, R., Paulik, E. How do medical students visit psychologists in Hungary? *European Journal of Public Health* 33: Supplement 2 pp. 597-597., 1 p. (2023). <https://doi.org/10.1093/eurpub/ckad160.-1497>
3. **Umami, A.**, Molnár, R & Paulik, E. Future physicians as health care providers: what happens to the students' health state and health behaviour during university years? In: *The Role of Health Promotion in Well-being-oriented Healthcare* (2023) pp. 52-52.,1 p.

Publications not related to the thesis:

1. **Umami, A.**, Sudalhar, S., Lufianti, A., Paulik, E., Molnár, R. Factors associated with genital hygiene behaviors in cervical cancer patients in Surakarta, Indonesia. *Nurse Media Journal of Nursing* 11, 1 (2021). <https://doi.org/10.14710/nmjn.v11i1.35829>

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2. **Umami, A.**, Paulik, E., Molnár, R., Murti, B. The relationship between genital hygiene behaviors and genital infections among women: A systematic review. *Jurnal Ners* 17, 1 (2022). <https://doi.org/10.20473/jn.v17i1.34402>
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3. **Umami, A.**, Sukmana, H., Wikurendra, E.A., Paulik, E. A review on water management issues: potential and challenges in Indonesia. *Sustain. Water Resources Management* 8, 63 (2022). <https://doi.org/10.1007/s40899-022-00648-7>
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4. Anas, M., Oktaviana, K.D., Prasetya, E.C., **Umami, A.** Relationship between demographic factors, knowledge, and injection contraceptive acceptors' visit compliance. *Open Access Maced J Med Sci.* 10, B (2022). <https://doi.org/10.3889/oamjms.2022.9531>
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5. Kusuma, I.Y., Pratiwi, H., **Umami, A.**, Kurniasih, K.I., Pitaloka, D.A.E., Suherman, S., Juhász, M. Knowledge, perceptions, and readiness of telepharmacy (KPR-TP) questionnaire among pharmacists: Development and psychometric evaluation. *Journal of Telemedicine and Telecare.* 1-11 (2023). <https://doi.org/10.1177/1357633X2311633>
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2. **Umami, A.**, Németh, É., Molnár, R., Paulik, E. **Umami, A.**, Németh, É., Molnár, R., Paulik, E. What kind of doctor am I going to be? the perceptions and stereotypes of future female medical professionals. *International Association for Health Professions Education (AMEE) Conference.* Glasgow, UK, 26-30th August 2023 In: *Inclusive Learning Environments to transform the future.* Abstract Book In Person 10P12, <https://amee.assetbank-server.com/assetbank-amee/action/viewAsset?id=4074&index=1&total=54&view=viewSearchItem>

Abbreviations

AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CI	Confidence Interval
DSI	Dominant Society Immersion
ESI	Ethnic Society Immersion
EU	European Union
GDS	Geriatric Depression Scale
GP	General Practitioner
HADS	Anxiety and Depression Scale
IQR	Inter Quartile Range
OR	Odds Ratio
PANAS	Positive and Negative Affect Schedule
PSS	Perceived Stress Scale
PTSD	Post-Traumatic Stress Disorder
SD	Standard Deviation
SMAS	Stephenson Multigroup Acculturation Scale
SRH	Self-Rated Health
SRMH	Self-Rated Mental Health
UAOR	Unadjusted Odds Ratio
UAOR	Unadjusted Odds Ratio
USZ	University of Szeged

1. Introduction

Physical and mental well-being are important determinants of medical doctors' lives, including their professional activity, which has a direct impact on the health and lives of patients (Niewiadomska et al., 2022). Globally, there has been a notable emphasis on the well-being of both the physical and mental health of doctors, along with addressing the significant stress they frequently encounter. This matter holds notable importance as compromised health can impact the overall efficacy of healthcare services (Gyorffy et al., 2016).

Female doctors, in particular, experience a higher prevalence of health problems, including burnout and fertility issues (Gyorffy et al., 2014). These challenges often begin during medical education, with studies showing that medical students frequently experience stress, anxiety, and burnout (Chew-Graham et al., 2003; Kurki et al., 2021; Shahaf-Oren et al., 2021). Burnout is a prevalent mental issue among medical students, and those pursuing medical studies abroad face an increased risk of experiencing this syndrome. This heightened risk is attributed to the combination of academic stress and the challenges arising from their new living situation (Gradiski et al., 2022).

Understanding the physical and mental health issues affecting medical students is crucial for guiding healthcare-seeking behaviour (Brimstone et al., 2007). Despite being more distressed than the general population (Dahlin et al., 2011; Kurki et al., 2021), there is limited information on the physical health of medical students, their behaviour when seeking assistance, and how it relates to accessibility issues or barriers to different types of care (Brimstone et al., 2007). Medical students often refrain from disclosing and seeking help, posing risks to themselves and patients (Dahlin & Runeson, 2007; Shahaf-Oren et al., 2021), highlighting the need for research on factors influencing their choices and the role of general practitioners (GPs) in supporting physical and mental health (Shahaf-Oren et al., 2021).

Medical students encounter a greater prevalence of health issues when contrasted with their counterparts in different academic disciplines (Dahlin et al., 2011; Kurki et al., 2021). This heightened susceptibility can be linked to the substantial risk factors inherent in pursuing education at a medical university and later practicing as a doctor (Brimstone et al., 2007). It is widely acknowledged that physicians frequently face difficulties pertaining to both their mental and physical well-being. Consequently, it becomes imperative to scrutinize their patterns of seeking healthcare, as enhancing this facet holds significant importance for addressing their future health requirements (Niewiadomska et al., 2022).

Simultaneously, the globalization of education has made studying abroad common, and universities around the world welcome large numbers of foreign students (Kim et al., 2019; Thürer et al., 2023), with international students facing unique challenges such as acculturative stress and adjustment difficulties (Smith & Khawaja, 2011; Thürer et al., 2023). There were 1.3 million students from abroad who were undertaking tertiary level studies across the European Union (EU) in 2018 (Eurostat, 2020). As a member of the EU, Hungary is one of the educational destinations for international students at 11.4% with over 32 thousand international students enrolled at Hungarian universities in the academic year of 2020/2021 (Hungarian Central Statistical Office, 2021). About one-third of the foreign students go to one of the four Hungarian medical universities (Pongratz, 2020).

In the context of the international academic landscape, acculturation emerges as a multifaceted and dynamic process, manifesting uniquely among international students (Krsmanovic, 2020). Acculturation encompasses the adaptation and adjustment to a new cultural environment and is recognized for its far-reaching impact on various aspects of international students' lives (Krsmanovic, 2020; Zhang & Zeng, 2023). The impact of acculturation affects several aspects of an individual migrant's life, influencing behaviours, access to healthcare, social support networks, self-esteem, and stress levels (Deslandes et al., 2024; Mengistu & Manolova, 2019; Zhang & Zeng, 2023).

Acculturation, in essence, reflects the intricate interplay between an individual's cultural background and the prevailing cultural norms of the host country (Sam & Berry, 2016). The experiences of international students are diverse, shaped by factors such as language proficiency, duration of stay, and the extent of interaction with the local community (Luo et al., 2021). As they navigate this process, their behaviours and well-being become intertwined with the degree to which they assimilate aspects of the new culture into their own identities (Yue et al., 2021). However, the relationship between acculturation and health remains a topic of debate, with studies showing non-linear effects (Deslandes et al., 2024; Mengistu & Manolova, 2019; Sam & Berry, 2016). It means that the impact of acculturation on health is not a simple, direct, or predictable process. Instead, it implies that various factors, such as individual differences, cultural variations, and contextual influences, can contribute to a more complex and varied relationship between acculturation and health (Fox et al., 2017a).

1.1. Health status and health behaviour

1.1.1. Self-rated health

Self-rated health (SRH) is a widely used indicator of general health status, assessing both physical and mental health (Dramé et al., 2023). It can be measured using a single question, such as "In general, would you say that your health is excellent, very good, good, fair, or poor?" (Aguñaga et al., 2023; Bombak, 2013). SRH has been found to be a reliable measure of general health and is strongly associated with mortality, health care utilization, and morbidity (Ahmad et al., 2014; Dramé et al., 2023). Demonstrating robust predictive capabilities for various health outcomes, including mortality, it maintains its effectiveness independently of indicators related to physical health (Dramé et al., 2023; Levinson & Kaplan, 2014). However, it is essential to note that SRH is subjective and may be influenced by various factors, such as socio-cultural differences, survey question formulation, and age (OECD, 2021). Additionally, the reliability of SRH may vary depending on the population and the context in which it is used (Reinwarth et al., 2023; Zajacova & Dowd, 2011).

To understand why this measure worked so well, studies started including mental and emotional factors alongside physical health. One explanation for why self-rated health predicts mortality is that people interpret the question not just about physical health but also about their overall well-being, including mental and social aspects (Levinson & Kaplan, 2014). In some studies, mental health was found to mediate the relationship between physical health and self-reported general health (Perruccio et al., 2011; Segerstrom, 2014). One study used the Anxiety and Depression Scale (HADS) with 449 adults undergoing hip or knee replacement in Canada (Perruccio et al., 2011). Another study used the Geriatric Depression Scale (GDS) in a long-term study of 150 older American adults (Segerstrom, 2014).

A study in Germany found that for healthier individuals (Schüz et al., 2011), feeling positive was more crucial than physical functioning in predicting self-rated general health. However, among less healthy individuals, physical functioning was more important. Feeling positive was measured using the Positive and Negative Affect Schedule (PANAS). Turning to mental health, evaluation of mental well-being through a single-item measure, known as Self-Rated Mental Health (SRMH), has been shown to be beneficial. Participants were asked to rate their mental or emotional health, and lower SRMH scores were consistently associated with future healthcare needs and mortality (Galambos et al., 2023).

In comparison to the single question about general health, the question "How would you rate your mental health?" is used less often in surveys (Levinson & Kaplan, 2014). A review found

fifty-seven studies with SRMH, but only four tried to validate SRMH against known measures of mental health (Ahmad et al., 2014). While SRMH was linked to the use of mental health and medical care services, using it as a substitute for mental health issues was not recommended when compared to other mental health indicators (Ahmad et al., 2014).

In a study conducted in Germany on the SRH of university students, it was found that the majority (92%) reported good and very good health. Despite this, significant health inequalities persist. The research, focusing on the socio-economic background of parents, reveals that students with parents in higher occupational statuses reported fewer health problems. This indicates that health inequalities among university students have indirect impacts through factors such as health behaviour, psychosocial resources, and material conditions (Deindl et al., 2023). Another study conducted among university students suggests that when assessing their overall health, the presence of psychosomatic complaints significantly influences their subjective health rating. The study highlights that while SRH is influenced by various physical, psychological, and psychosomatic aspects of health, its strongest association is with psychosomatic complaints. Moreover, the results propose that SRH can be reasonably used to compare students' health across different countries, with minimal variations in the effects of variables associated with SRH by gender and country, except for well-being and self-efficacy (Mikolajczyk et al., 2008).

The study on Portuguese medical students during the academic year 2022/23 revealed a high prevalence of distress, with almost half showing depressive symptoms. Distress levels did not vary significantly between medical schools but were higher in pre-clinical years. Predictors of distress included burnout, female gender, physical health issues, non-heterosexual orientations, family and relationship problems, academic difficulties, and organizational challenges. Protective factors were satisfaction with social support and academic ratings (D'Alva-Teixeira et al., 2023).

The key result from a study conducted by Strous et al. (2012) on medical students' self-report of mental health conditions is that a significant proportion (55.5%) reported experiencing symptoms of mental illness, although many had minimum severity. More than half of the students reported experiencing Axis I and Axis II disorders, with mood disorders and obsessive-compulsive traits being the most common. Fifth-year students reported more Axis I disorders than first-year students, and female students reported more Axis I disorders than their male counterparts. The study highlights the prevalence of mental health conditions among medical students and emphasizes the need for ongoing support programs tailored to their specific needs (Strous et al., 2012).

1.1.2. Health behaviour

Engaging in high-risk behaviours like smoking, alcohol consumption, anti-social activities, drug abuse, and unprotected sexual intercourse has been associated with elevated risks of morbidity and premature mortality (MacArthur et al., 2012). The youth, particularly university students, may encounter crises related to decision-making, often influenced by familial and social conflicts (Sorush et al., 2018). Upon entering tertiary education, students, constituting a substantial portion of the young population, transition to a phase of independent living from their parents. This shift exposes them to a new university environment, which has the potential to impact their lifestyle negatively (El-Kader et al., 2023).

A study using latent class analysis conducted by Kwan et al., 2016 identified multiple health risk behaviour patterns among university students. The study suggested that high-risk health behaviours among university students, such as smoking, binge drinking, and drug use, were associated with higher levels of stress and poorer mental health outcomes, particularly in terms of reported stress levels. Additionally, high-risk students showed higher prevalence of other mental health issues like fatigue, anxiety, depression, and psychological distress (Kwan et al., 2016).

Several studies have highlighted the prevalence of health risk behaviours among medical students. These behaviours include physical inactivity, poor dietary habits, tobacco and alcohol use, risky sexual behaviours, and inadequate sleeping (El-Kader et al., 2023; Nacar et al., 2015; Sorush et al., 2018). The cross-sectional study conducted by El-Kader et al 2023 at medical university in United Arab Emirates, included 383 systematically randomly selected students. The majority of participants were females (69.7%), with 13.3% classified as obese and 28.2% as overweight. Gender differences were observed in medication intake without prescription, nutrition, physical activity, and health-related topics. A significant portion of students were attempting to lose weight, and male smokers had fewer attempts to quit tobacco product use than females. The findings highlighted health promotion opportunities for university students, emphasizing the need for initiatives to foster a healthier youth in society (El-Kader et al., 2023).

Other study from Turkey found that hazardous health behaviour was prevalent among medical students, with higher risks among males and final year students (Nacar et al., 2015). A cross-sectional study was conducted on medical students in Iran stated that regarding lifestyle habits, 10.5% reported daily smoking in the past month, while 10.2% mentioned alcohol consumption during the same period. The mental health aspects revealed that 26.6% of students

reported a sense of depression and hopelessness. Alarming, 5.5% had seriously contemplated suicide, and among them, 3.6% had attempted suicide, with some making multiple attempts (Soroush et al., 2018). The study also found that risky behaviours were more dominant among males, while being very low among females (Shekari et al., 2020). A cross-sectional study of health risk behaviours among medical students in Saudi Arabia found that 4.2% of the students were current cigarette smokers and 2.6% were current water pipe smokers (Al-Harbi & Farajat, 2019).

Health behaviours among medical students can vary by country due to cultural, socioeconomic, and educational factors. Some studies have compared health behaviours among medical students in different countries, revealing differences in specific areas. A study comparing health behaviours among students from Poland and other countries found that students from Poland received the greatest support with regard to health-promoting activities, fewer health science students used tobacco, were binge drinkers, or gambled once a week or more than non-health science students (Lesińska-Sawicka et al., 2021).

The study investigated tobacco use among international medical students, focusing on cigarette, waterpipe, and e-cigarette consumption, and examined its association with self-reported health status. The study conducted in Germany and Hungary with participants from 65 nationalities found that 18.0% of students reported cigarette smoking, 4.8% used waterpipes, and 0.9% used e-cigarettes. Males had a higher prevalence of cigarette smoking, and Norwegian students exhibited the lowest rate. Age correlated with smoking habits, and religious involvement was protective against cigarette smoking. Financial situations showed no significant association. Both cigarette smokers and e-cigarette users reported worse health status. The study emphasizes the importance of addressing varied tobacco use among medical students and advocates for comprehensive prevention programs (Balogh et al., 2018).

In a separate investigation conducted by Balogh et al. (2021), which examined tobacco smoking and smokeless tobacco utilization among both local and international medical students in Hungary, it was discovered that students from Norway demonstrated the lowest incidence of cigarette smoking, standing at 13.0%. In contrast, elevated rates were observed in Hungary (21.5%), Germany (34.2%), and the Multinational group (29.5%). Conversely, the prevalence of utilizing smokeless tobacco was notably higher among Norwegian students (40.9%), in contrast to lower rates in Hungary (1.4%), Germany (2.6%), and the Multinational group (6.2%). The use of waterpipes, cigars, and pipes was infrequent across all groups, typically reported at 1–3 times per month (Balogh et al., 2021).

1.1.3. Healthcare-seeking behaviour

Healthcare-seeking behaviour refers to any action taken by individuals facing a health-related issue with the intent of finding a suitable solution and varies due to factors such as cognition, awareness, socio-cultural influences, and economic considerations. This decision-making process is diverse and influenced by various demographic factors (Khadka et al., 2022).

Healthcare-seeking behaviour encompasses choices such as self-medication and the exploration of alternative medicine, reflecting the range of approaches individuals may take in addressing their healthcare needs (Khadka et al., 2022). The interaction of these elements significantly influences an individual's decision-making process (Wamaani et al., 2023). Choosing alternative medicine or self-medication falls under the category of seeking healthcare (Bhandari & Chatau, 2020). Unlike self-care, this involves using medications that can have positive or negative effects (Wamaani et al., 2023).

The factors associated with seeking healthcare among medical students include various physical and psychological issues, the presence of chronic illnesses, gender, and the stage of studying (Khadka et al., 2022). A study in Nepal clarified that medical students tend to do informal consultation and often practice self-medication (Bhandari & Chatau, 2020). Another study conducted in India found that the knowledge of medical science has not satisfactorily ensured better healthcare-seeking behaviour and good practices among medical students and 74.2% of the respondents took medicines without a proper prescription, and there was a high prevalence of self-medication practice among medical students (Khadka et al., 2022). Since medical students are well-versed in both drugs and illnesses, they are more likely to adopt this approach (Ajaegbu & Uboch, 2016).

Overall, these studies suggest that healthcare-seeking behaviour among medical students can vary depending on the country and other factors, but medical students tend to seek healthcare for various physical and psychological issues.

The barriers to healthcare-seeking behaviour among medical students, particularly in the context of mental health, can be attributed to systemic and individual factors. On the one hand, systemic barriers include cost, affiliation of counsellors with medical schools, and access to mental healthcare services. On the other hand, individual barriers encompass stigma, fear of non-confidentiality, fear of impact on academic record, and fear of decreased career opportunities and discrimination (Berliant et al., 2022). Additionally, medical students face an increased burden of depression, anxiety, and mental stress compared to their nonmedical peers, which can impact their healthcare-seeking behavior (Nair et al., 2023).

It is important to understand these barriers to improve medical students' access to healthcare services, especially in the context of mental health.

1. *Socio-cultural factors*: refer to the influence of social and cultural elements on individuals. In the context of medical students seeking healthcare, these factors can play a significant role. Societal stigmas related to mental health or certain medical conditions can deter medical students from seeking help (Menon et al., 2015). Cultural beliefs surrounding health and illness may impact their willingness to discuss or address health concerns openly. Cultural perspectives on mental health can significantly impact medical students, as some cultures may stigmatize mental health issues or consider them taboo. This can hinder open discussions and prompt students to avoid seeking help for mental health concerns (Berliant et al., 2022).
2. *Cost and inaccessibility*: a study declared that factors affecting healthcare-seeking behaviours were medical education, excessive waiting times, cost, and inaccessible medical services (Sawalha, K. et al., 2017). In a review study it was found that there were differences between the two groups in terms of perceptions and barriers to healthcare. Among first-year students, lack of time, unawareness about where to seek help, cost and fear of academic jeopardy were common barriers to mental healthcare. Issues surrounding stigma were reported by final-year medical students as it pertained to seeking mental health services (Tran & Silvestri-Elmore, 2021).
3. *Stress and hectic nature of medical courses*: The stressful and hectic nature of medical courses can significantly influence students' healthcare-seeking behaviour, particularly in the context of mental health. The demanding and fast-paced nature of medical courses can have a notable impact on how students approach seeking healthcare. The intense stress, heavy workload, and the general challenging environment of medical education can shape students' healthcare-seeking behaviour. The unique pressures of this field may influence when, why, and how students choose to seek medical assistance, especially concerning their physical and mental well-being (Berliant et al., 2022; Sawalha, K. et al., 2017; Wamaani et al., 2023).

Overall, these barriers can influence medical students' healthcare-seeking behaviour when visiting a GP and/or psychologist. Addressing these barriers through targeted interventions and support services can help promote medical students' well-being and academic success.

1.2. Acculturation

1.2.1. Concept of acculturation

The definition of acculturation originated in North American anthropology during the late 19th century, specifically to describe the consequences of contact between colonized and colonizing societies during colonization (Rudmin, 2003). The initial publications lacked a clear definition, but in the 1930s, anthropologists collectively defined acculturation as the phenomena resulting from continuous first-hand contact between groups with different cultures, leading to changes in the original cultural patterns of either or both groups (Schumann et al., 2020).

Acculturation is the process of cultural and psychological transformation that occurs as a result of intercultural contact (Sam & Berry, 2016). It entails learning to deal with a new cultural situation and regarded as one of the common intercultural competence processes (Kajiura, 2007). Cognitive, emotional, and behavioural dimensions of acculturation are viewed as stages in increasing intercultural sensitivity to cultural difference (Hammer et al., 2003). This sensitivity, defined as "the ability to discriminate and experience relevant cultural differences," is regarded as a key skill for intercultural communication. Openness, flexibility, self-esteem, and confidence are examples of other competencies (Hammer et al., 2003, p. 422).

According to non-dominant cultural groups, when individuals do not want to maintain their cultural identity and seek daily interaction with other cultures, they use the assimilation strategy. In contrast, when individuals maintain their original culture while avoiding interaction with others, they use the separation alternative. When people are interested in maintaining their original culture while having daily interactions with other groups, they use the integration strategy. Finally, a marginalization strategy is employed when there is little possibility or interest in cultural maintenance, as well as little interest in social interaction (Deslandes et al., 2024; Tang & Zhang, 2023; Thürer et al., 2023).

From the perspective of specific ethnocultural groups, as opposed to the larger society, four acculturation strategies have been identified: assimilation, separation, integration, and marginalization (Berry, 2006; Sam & Berry, 2016).

These strategies are intended for non-dominant groups and individuals within dominant cultures. However, this is not always the case. According to the definition of acculturation, both non-dominant and dominant groups can become acculturated (Thürer et al., 2023; Zhang & Zeng, 2023). When the non-dominant acculturating group seeks assimilation, the process is referred to as a melting pot; when the dominant group seeks assimilation, the process is referred

to as a pressure cooker. When the dominant group forces separation, it is referred to as segregation, and when the dominant group forces marginalization, it is referred to as exclusion. Finally, when diversity is a societal goal, the process of integration is referred to as multiculturalism (Chun et al., 2003; Saygin & Hasta, 2018).

In plural societies, various groups of people from different cultural backgrounds coexist. According to Sam and Berry (2006), immigrants voluntarily relocate to other locations in search of a better life (Sam & Berry, 2016). Refugees and asylum seekers (forced migrants) typically do not want to leave their home country, but external factors force them to do so. Sojourners are temporary participants in their new society, whereas immigrants are mostly permanent participants. For example, international students, like diplomats and workers, usually move into different cultures with reluctance to become fully immersed because they know they will leave eventually (Anderson & Guan, 2020; Pedersen et al., 2011).

The basic concept of acculturation is the first-hand interaction between two or more cultures (Sam & Berry, 2016). Several theories investigate the transformation direction of acculturation and its health effects (Deslandes et al., 2024). Many researchers see acculturation as a single continuum-changing process, moving from maintenance of the hometown culture on one side to immersion in the host culture at the other (Deslandes et al., 2024; Sam & Berry, 2016), generating the unidimensional model. This model, also known as the linear or bipolar model, indicates that the increasing adoption of one culture leads to reduction of the other. Under the guidance of the unidimensional model, most empirical studies use zero-sum scales such as the Acculturation Rating Scale for Mexican Americans (Jimenez et al., 2010). However, for the last few decades, viewing acculturation as a unidirectional process has been critiqued as prohibiting migrants from acculturation to both the host as well as origin culture simultaneously (Andrews et al., 2013).

The new theoretical framework argues that the maintenance of the hometown culture and the adoption of the host culture must be seen as two independent dimensions (Berry, 2004). The new bidimensional model was proposed, suggesting that the increase or decline of one culture does not affect the other. The different acculturations depend on the individual's desire to take part in the host culture, as well as the cultural attitude of the receiving society (Deslandes et al., 2024; Fassaert et al., 2009).

The bidimensional model requires the measuring of acculturation changes in each cultural dimension individually (Sam & Berry, 2016). Some scholars also regard acculturation as an interaction between host and origin cultures, without specific transformation directions (Deslandes et al., 2024; Guarnaccia & Hausmann-Stabile, 2016).

1.2.2. Acculturation of international students

Individuals who travel abroad for a limited period of time are referred to as sojourners; international students, tourists, expatriate workers, international civil servants, and military are some of the most common sojourner groups (Pedersen et al., 2011; Sam & Berry, 2016). Among these groups, international students seek professional qualifications through education and may stay in the host country for several months or years.

The adjustment of international students – sojourners – follows a U-shape curve with four phases. At first, international students may experience euphoria, as they are fascinated by the new culture. However, this stage may not last long. Usually after six weeks of relocation, the culture shock phase starts (Rainoldi & Gölzner, 2014). In this phase, individuals may start feeling frustration, loneliness, and anxiety (Oberg, 2016). This initial adjustment process to new culture is called culture shock (Oberg, 2016; Tang & Zhang, 2023). At this stage, international students may also feel confused and overwhelmed by their lack of knowledge and understanding of the host culture (Oberg, 2016; Rainoldi & Gölzner, 2014). The duration and intensity of this stage may vary depending on individuals' personality, perceived social support, and coping mechanisms (Tang & Zhang, 2023). Furthermore, culture shock can have a negative impact on an individual's physical and psychological well-being (Fox et al., 2017a).

When the culture shock phase is over, the acculturation phase begins. During this stage, international students learn to deal with new situations and gradually adapt to a new culture. In the third stage, individuals need to be aware of their adaptation strategy (i.e., assimilation, integration, separation, and marginalization) and take necessary actions for a desired state of positive acculturation. The final stage of adjustment is known as the stable state. Individuals may feel discriminated against, assimilated, or integrated into the new culture based on their acquired adaptation strategy. As a result, sojourners eventually learn how to deal with difficult emotions, cultural differences, and enjoy a stable state (Rainoldi & Gölzner, 2014).

International students generally expect to spend a limited amount of time in a different country or culture; thus, these individuals tend to have online support from their family and friends in their home country via phone or other social media resources (Tang & Zhang, 2023; Yue et al., 2021). Although some acculturation is required for these individuals, the knowledge that they will eventually return to their home country may cause fewer concerns about changing identity or behaviours (Berry et al., 2011). Furthermore, most sojourners have a plan and preparation in place ahead of time, which allows them to adjust easily. Although preparation and a settlement plan are beneficial, the degree and quality of engagement with the host culture

are more important factors in international students' adjustment. According to Berry (2006), the primary networks of international students are people from the same culture. Following that, these students socialize with other international students, and the third network includes the friends from host nations (Mrekajova, 2017). Thus, to ease the transition, it is wise for international students to seek help from friends to become knowledgeable about local customs and traditions (Tang & Zhang, 2023).

Acculturation is not the same for all international students. Students' degrees of acculturation towards other cultures vary depending on their different backgrounds and other factors (Thürer et al., 2023), resulting in different preferences for which acculturation strategies to employ.

1.2.3. Acculturation to health: from a unidimensional to bidimensional model

The relationship between acculturation and health has attracted general attention (Choy et al., 2021; Klein et al., 2020), however, the framework theory of acculturation is still surrounded by controversy.

Within the various theoretical frameworks, the relationship between acculturation and health has been studied for decades (Alkerwi et al., 2012; Andrews et al., 2013). Acculturation has been proven to influence health through healthy behaviours, access to healthcare services, social support, self-esteem and stress (Fassaert et al., 2009; Mengistu & Manolova, 2019). Most empirical studies using a unidimensional model consistently found that non-dominant groups with low acculturation are more likely to have general health issues (Guarnaccia & Hausmann-Stabile, 2016) and diabetes (Shah et al., 2015).

Research has shown that the direction and magnitude of the relationship between acculturation and health vary, often yielding contradictory results. A study, among Chinese Americans, acculturation has been associated with both higher and lower health outcomes (Fox et al., 2017a). Additionally, the relationship between acculturation and mental health has been studied, revealing significant correlations between acculturation styles and mental health, with the strength of this relationship differing based on gender (Klein et al., 2020). The complex nature of acculturation and its impact on health necessitates the consideration of sociocultural context and other effect modifiers to fully understand this relationship (Fox et al., 2017a, 2017b). Therefore, it is important to recognize that the influence of acculturation on health is not straightforward and may be conditional, requiring a comprehensive approach to study and understand its effects (Deslandes et al., 2024).

However, studies also found that the relationship between acculturation and health was not linear (Fox et al., 2017a; Klein et al., 2020; Sam & Berry, 2016). For another example, greater heritage identity significantly decreased the odds of poor self-rated health in Arab Americans, while greater acculturation (mainstream identity) was not significantly associated (Suleiman et al., 2021). The ability to identify and understand one's health status within the context of a host country whose socio-cultural norms have not been assimilated into that individual may thus explain the link between acculturation and disease status (Johnson et al., 2010).

Most studies used Berry's four-cell typology model, which adhered to the bidimensional theory (Sam & Berry, 2016). The distinction between the four acculturation strategies includes mid-point score of the two-culture orientations (Asif, 2018). Additionally, Rojas et al. (2014) utilized K-means cluster analysis to improve the categorization process, which in this context assisted researchers in classifying individuals into the four acculturation strategies based on their scores on the two-culture orientation scale (Rojas et al., 2014). The results consistently found that an integration acculturation strategy had the best health outcomes, but the health effects of other acculturation statuses varied by population and health outcomes (Alkerwi et al., 2012; Delavari et al., 2013; Fox et al., 2017b). For instance, Bhui et al. (2005) found that African–Caribbean students with assimilation status were associated with more tiredness and traditionalists with less obesity, while integrated Bangladeshi students had less depression (Bhui et al., 2005). Compared with the other acculturation strategies, integrated students positively experience belongingness in the receiving society, continue to identify with their individual culture, and are supported from both societies. A systematic review by Choy et al., (2021) revealed that marginalisation had the most negative effects on non-dominant populations' mental health, while integration had the most positive effects. The study also identified three key sources that may contribute to acculturation stress and poor mental health: a lack of education or skill set, a lack of proficiency in the host country's language, and financial difficulties (Choy et al., 2021). Furthermore, the role of acculturation, specifically one's level of assimilation to the host country's health behaviours, may influence how health is perceived (Johnson et al., 2010).

2. Aim of the study

The main aim of this study was to investigate medical students' health status, health behaviour, healthcare-seeking behaviour, and additionally, acculturation among international medical students in Hungary.

The detailed objectives of this study were the followings:

- to describe student's health status and health behaviour;
- to explore students' healthcare-seeking behaviour particularly the visits to GPs and psychologists by
 - examining patterns of healthcare-seeking behaviour among medical students;
 - identifying factors associated with visiting both GPs and psychologists;
- to explore students' health status, health behaviours and visiting the health professionals by gender;
- to explore students' health status, health behaviours and visiting the health professionals before and during university;
- to measure acculturation and the associated factors;
- to explore the impact of acculturation on health within the unique context of international medical students in Hungary;
- to analyse the association between acculturation and self-rated health among international students.

3. Material and methods

3.1. Study design and sample

A cross-sectional study was delivered among medical students at the University of Szeged (USZ), Hungary. The study was carried out between April and October 2021. The medical students from the first to sixth years were invited to participate in the online survey. The survey was completed by 326 international and 362 Hungarian medical students (in total 688 students). The participation was voluntary and anonymous.

3.2. Data collection, variables, and measurements

3.2.1. Data collection

Online questionnaires were used to collect data. Students were requested to complete the questionnaire by clicking on the link given on the teaching platform before or after the teachers delivered the lecture or practice. The questionnaire took about 10–15 minutes to complete. The questionnaires were available in both English and Hungarian, and participants were required to fill in the informed consent before starting the online survey. Only fully completed questionnaires were taken into account. In our online questionnaire, respondents were required to answer all questions, as it was designed to prevent the submission of incomplete responses. This approach ensured that participants could only proceed with the survey after providing answers for all the questions.

3.2.2. Variables and measurements

Demographic factors

- 1) Age: students were asked to provide their age in years. For data analysis, age was divided into two categories: 18–25 and 26–37 years.
- 2) Sex: students were given the choice of choosing either a male or female sex on the questionnaire.
- 3) Years of study were categorized into ‘preclinical (1st/2nd)’ and ‘clinical (3rd/4th/5th/6th)’.
- 4) Relationship status was dichotomized as ‘not in relationship (single/divorced/living separated)’ and ‘in relationship (married/common-law marriage/living together/ having a partner but not living together)’.
- 5) The financial situation of the students' family was evaluated by a 5-point Likert scale, which was dichotomized as ‘low income’ (very bad/bad/average) and ‘high income (good/very good)’.

- 6) Country of origin was classified according to the continent of the home country as 'European' and 'Non-European' (Africa, America, Asia, and Middle East).
- 7) Ethnic minority, whether students belong to an ethnic minority in their home country, had 'yes' or 'no' answers.

Health status

- 1) Chronic diseases: if medical students ever experienced any chronic illness during their study period, either self-determined or diagnosed by a doctor; response options were 'yes' or 'no' answers.
- 2) Body mass index (BMI) is a simple index of weight-to-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m^2). The World Health Organization (WHO) provides a widely used classification system for BMI (Weir & Jan, 2023), which includes the following categories:
 - $\text{BMI} < 18.5 \text{ kg}/\text{m}^2$: underweight
 - $\text{BMI} = 18.5\text{-}24.9 \text{ kg}/\text{m}^2$: normal weight
 - $\text{BMI} \geq 25.0 \text{ kg}/\text{m}^2$: overweight
 - $\text{BMI} \geq 30.0 \text{ kg}/\text{m}^2$: obesity.

For the statistical analysis in this study, there were two categories, underweight and normal ($\text{BMI} \leq 24.9 \text{ kg}/\text{m}^2$) and overweight and obese ($\text{BMI} \geq 25.0 \text{ kg}/\text{m}^2$).

- 3) Self-rated general health (SRH) was reported by using a five-point Likert scale (1=very bad, 5=very good). The respondents had to answer the question regarding general health, "How do you evaluate your general health status?" For the purposes of data analyses, self-rated general health was categorized as good (scores 4 and 5) and poor (scores 1 to 3).
- 4) Self-rated mental health (SRMH) was reported by using a five-point Likert scale (1=very bad, 5=very good). The respondents had to answer the question regarding mental health, "How do you evaluate your mental health status?" For the purposes of data analyses, self-rated mental health was categorized as good (scores 4 and 5) and poor (scores 1 to 3).

Health behaviours

- 1) Smoking: the response options were "Yes, occasionally"; "Yes, regularly"; and "No". In the analysis both occasional and regular smokers were considered as smokers.

- 2) Alcohol consumption: the response options were “Yes, occasionally”; “Yes, regularly”; and “No”. In the analysis both occasional and regular alcohol consumption were considered as alcohol drinkers.
- 5) Sexual intercourse: if the students ever had sexual activity during medical school, and the response options were ‘yes’ or ‘no’ answers.

Healthcare-seeking behaviour

Healthcare-seeking behaviour is defined as any activity performed by those who assumed they had a health issue or became ill with the intention of discovering an appropriate treatment. Researchers determined that visit to the GP and psychologist are forms of healthcare-seeking behaviours. The question asked did the student visit the GP, dentist, specialists, or a psychologist in the previous year? The response options were ‘yes’ or ‘no’ answers.

The questions on health status, health behaviour and healthcare-seeking behaviour were asked regarding the period before their university studies and during university as well, that allowed us to examine changes during their university years.

Perceived Stress

The 10-item Perceived Stress Scale (PSS-10) (Cohen et al., 1983) is a 10-item questionnaire originally developed by Cohen et al. (1983). Respondents were asked how often they felt a certain way on a five-point scale from ‘never’ to ‘very often’. PSS is not a diagnostic instrument, and the developer has not published any score cut-offs. In the current study, for the purposes of data analysis, PSS was categorized as lower stress (score <14) and higher stress (score \geq 14) categories refer to previous study (Seedhom et al., 2019).

Acculturation

To assess the acculturation status of international medical students in Hungary, we used the modified Stephenson multigroup acculturation scale (SMAS).

The original SMAS is a 32-item questionnaire, initially developed for respondents from five different ethnic groups in America. The scale yields two factor solutions: ethnic society immersion (ESI) and dominant society immersion (DSI). Scores on each of the two dimensions were expected to measure immersion in each society. Within each dimension, items were generated to reflect the domains of language, interaction, media, and food. Furthermore, each

domain reflected knowledge, behaviours, and attitudes (e.g., language knowledge, language behaviour, and language attitude) (Stephenson, 2000).

This questionnaire was adapted by Asif (2018), in which he modified the original version by removing some questions related to the English language ability of respondents since being able to read, write, and speak English was one of the inclusion criteria (Asif, 2018). In the current study, we used this modified 28-item questionnaire (ESI=16 items, DSI=12 items). The items of the questionnaire are available in the Appendix (*Supplementary table*). The answers included a Likert response format: 1=false, 2=partly false, 3=partly true, and 4=true. (See below the items in *Figure 1, 2*)

The ESI score reflects the level to which one retains values and practices of an ethnic group (home country), whereas the DSI score reflects the extent to which an individual adopts the practices of the dominant society (host country). Cronbach's alpha in Asif's study was 0.72 for DSI and 0.62 for ESI. The Cronbach's alpha of the modified SMAS in our study was 0.82 for ESI and 0.88 for DSI, showing a good internal consistency of both domains.

In the analysis of acculturation data, the scores were divided into two main categories according to the mean values of ESI and DSI scores: low ESI with a score less than 3.19 and high ESI with a score equal to or greater than 3.19. Similarly, the scores for DSI are categorized as low, if they are below 2.05 and high, if equal to or greater than 2.05.

To delve deeper into acculturation patterns, these categories are further classified into four groups based on Berry's acculturation theory:

- *Separation*: This category may involve individuals who prefer to maintain their ethnicity and avoid dominant societies.
- *Integration*: Individuals in this category may exhibit a balanced immersion in both their ethnic and dominant societies, seeking a harmonious coexistence.
- *Marginalization*: This category may include individuals who feel disengaged from both their ethnic and dominant societies, experiencing a sense of being on the fringes.
- *Assimilation*: Individuals in this category may fully adopt the practices and values of the dominant society, potentially leading to a loss of their ethnic identity.

3.3. Statistical analysis

Data were analysed by IBM SPSS 'Statistics 28.0'. We used descriptive statistics to summarize the sample characteristics including frequency, percentage, mean and standard deviation (SD). The Chi-square test was used to determine whether there was a significant association or dependence between two categorical variables. Univariable binary logistic

regression was used to assess the unadjusted odd ratio between dependent and independent variables. Multivariable logistic regression models were constructed to evaluate adjusted relationships. In the logistic regression analysis Hosmer and Lemeshow proposed a goodness-of-fit test and Nagelkerke R^2 values were used to evaluate the explanatory power of the models. Odds ratio (OR) and 95% confidence interval (CI) were used to indicate the association between acculturation and independent variables.

The Chi-square test was utilized in this study to analyse the relationships between socio-demographic characteristics, health status, health behaviours, and healthcare-seeking behaviour. Additionally, it was employed to examine the associations between socio-demographic characteristics, health behaviours, and acculturation.

The McNemar test was used to evaluate whether there is a significant difference in proportions between two conditions or different time points. In this research, to compare variables related to health status, health behaviour, and visits to health professionals before and during university.

Univariable logistic regression analysis of these variables was performed to evaluate unadjusted relationships, only variables that have a $p < 0.05$ were carried out by multivariable analysis. Multivariable logistic regression models were constructed to evaluate adjusted relationships, the adjusted variables were socio-demographic factors (age, sex, years of study, relationship status, and economic status). All analyses were conducted separately in Hungarian and international students.

Univariable and multivariable logistic regression analyses were used to examine the relationship between acculturation and self-rated health by adjusting for covariates. The independent variables involved into the regression analysis were acculturation measured by ESI and DSI, while covariates were student age, gender, year of study, country of origin, relationship status, economic status, and ethnic minority. Student age, ESI, and DSI were considered as continuous variables in this model.

3.4. Ethical permission

The study protocol was reviewed and approved by the Human Institutional and Regional Biomedical Research Ethics Committee, University of Szeged, Hungary (license number: 4936). All participants were informed of the objectives and procedures of the study and their rights to withdraw from the study. Informed consent was obtained from all included participants. Anonymous data were collected and held securely.

4. Results

4.1. Characteristics of study sample

The study sample of 688 medical students consisted of 362 Hungarian medical students and 326 international medical students. *Table 1* shows the students' demographic characteristics. The majority (86.6%) of the students were aged 18–25 years with the mean age of 22.47 ± 2.75 years. In the group of international medical students, the male-female ratio was almost equal (46.3% vs. 53.7%). In contrast there were significantly ($p < 0.001$) more females (67.7% vs. 32.3%) in the group of Hungarian medical students. Approximately one-third of the participating international students (31.3%) were from clinical years. In contrast, the Hungarian student group had an almost equal distribution, with 52.8% in the pre-clinical year and 47.2% in the clinical year.

Table 1 Socio-demographic factors of respondents by Hungarian and international medical students.

Characteristics	Total (688)		Hungarian (362)		International (326)		p*
	N	%	N	%	N	(%)	
Age (years)							
18–25	596	86.6	326	90.1	270	82.8	0.005
26–37	92	13.4	36	9.9	56	17.2	
Sex							
Male	268	39.0	117	32.3	151	46.3	<0.001
Female	420	61.0	245	67.7	175	53.7	
Years of study							
Preclinical	415	60.3	191	52.8	224	68.7	<0.001
Clinical	273	39.7	171	47.2	102	31.3	
Relationship status							
Not in a relationship	425	61.8	181	50.0	244	74.8	<0.001
In a relationship	263	38.2	181	50.0	82	25.2	
Economic status							
Average income	247	35.9	161	44.5	86	26.4	<0.001
High income	441	64.1	201	55.5	240	73.6	
Country of origin							
Non-European	202	29.4	4	1.1	198	60.7	<0.001
European	486	70.6	358	98.9	128	39.3	
Ethnic minority							
No	634	92.2	356	98.3	278	85.3	<0.001
Yes	54	7.8	6	1.7	48	14.7	

*The results from Chi-square tests.

Among Hungarian students, the proportion of those in a relationship status and those not in a relationship status was equal, with 50% in each category. In contrast, among international students, only a quarter have a relationship status, while approximately 75% of them are not in a relationship. The economic status was mostly high income among international students (73.6%). Hungarian students were almost equal between average and high income, 44.5% and 55.5%, respectively.

More than half (60.7%) of the international students were from non-European countries, with 34.7% of the participants originating from the Middle East, 19.0% from Asia, 5.2% from the Americas, and 1.8% from Africa. Meanwhile, the Hungarian student group had only four students with non-European origins, hailing from Afghanistan, Canada, the USA, and Vietnam. Despite their non-European origins, these students were identified as European, being fluent in Hungarian. It is likely that their parents, having married non-Europeans, subsequently relocated to other countries. Among the international student group, 14.7% had experienced ethnic minorities, while only 1.7% of the Hungarian student group had similar experiences regarding ethnic minorities.

There were significant differences between the Hungarian and the international medical students in socio-demographic factors, such as age, sex, year of study, relationship status, economic status, country of origin, and ethnic minority.

4.2. Health status and health behaviour of Hungarian and international students

4.2.1. Health status

In general health status (*Table 2*), the majority (83.6%) indicated an absence of chronic disease, with a slightly higher distribution among international participants (86.2%); the difference was not statistically significant ($p=0.078$). Approximately 16.4% indicated having a chronic disease, with a slightly higher frequency among Hungarians (18.8%). However, this difference was not statistically significant.

According to BMI, 77.5% had $BMI \leq 24.9$ kg/m². There was a significant difference between the groups ($p < 0.001$), with a higher proportion of Hungarians (84.0%) in this category compared to internationals (70.2%); 22.5% had $BMI \geq 25.0$ kg/m², and international students showed higher percentage compared to Hungarians (29.8% vs. 16.0%). For self-rated general health, 66.9% perceived it as good, with no statistically significant difference between Hungarians (66.3%) and internationals (67.5%) ($p=0.741$). About 33.1% perceived their self-rated general health as poor, with no notable differences.

Table 2 Health status of respondents by Hungarian and international medical students.

Characteristics	Total (N=688)		Hungarian (N=362)		International (N=326)		p*
	N	%	N	%	N	%	
<i>General health status</i>							
Chronic disease							
No	575	83.6	294	81.2	281	86.2	0.078
Yes	113	16.4	68	18.8	45	13.8	
BMI							
≤ 24.9 kg/m ²	533	77.5	304	84.0	229	70.2	<0.001
≥ 25.0 kg/m ²	155	22.5	58	16.0	97	29.8	
Self-rated general health							
Good	460	66.9	240	66.3	220	67.5	0.741
Poor	228	33.1	122	33.7	106	32.5	
<i>Mental health status</i>							
Perceived stress scale (PSS)							
Lower	545	79.2	276	76.2	269	82.5	0.043
Higher	143	20.8	86	23.8	57	17.5	
Self-rated mental health							
Good	338	49.1	174	48.1	164	50.3	0.557
Poor	350	50.9	188	51.9	162	49.7	

*The results from Chi-square tests.

Concerning mental health status, 79.2% reported lower perceived stress, slightly higher among internationals (82.5%) than Hungarians (76.2%) ($p=0.043$). Higher stress was reported by 20.8%, notably higher among Hungarians (23.8%). For self-rated mental health, 49.1% perceived it as good, with similar distribution among Hungarian (48.1%) and international (50.3%) participants, and no significant difference ($p=0.557$). The remaining 50.9% perceived it as poor, slightly higher among Hungarians (51.9%) than internationals (49.7%).

4.2.2. Health behaviour

In this study, we investigate health-related behaviours among medical students, focusing on smoking, alcohol consumption, and sexual behaviour (*Table 3*).

In terms of smoking, the majority of respondents (77.5%) did not smoke regularly, and this pattern was consistent among both Hungarian (78.7%) and international (76.1%) participants, with no statistically significant difference between the two groups ($p=0.050$). Occasional smoking was reported by 14.7% of respondents, with a slightly higher prevalence among Hungarian participants (15.7%) compared to their international counterparts (13.5%). Notably, 7.8% of respondents were regular smokers, and a higher percentage of international participants (10.4%) reported regular smoking compared to Hungarian participants (5.5%).

Table 3 Health behaviour of respondents by Hungarian and international medical students.

Characteristics	Total (N=688)		Hungarian (N=362)		International (N=326)		p*
	N	%	N	%	N	(%)	
<i>Health behaviour</i>							
Smoking							
No	533	77.5	285	78.7	248	76.1	0.050
Yes, occasionally	101	14.7	57	15.7	44	13.5	
Yes, regularly	54	7.8	20	5.5	34	10.4	
Alcohol consumption							
No	206	29.9	80	22.1	126	38.7	<0.001
Yes, occasionally	410	59.6	257	71.0	153	46.9	
Yes, regularly	72	10.5	25	6.9	47	14.4	
Sexual intercourse							
No	324	47.1	151	41.7	173	53.1	0.003
Yes	364	52.9	211	58.3	153	46.9	

*The results from Chi-square tests.

Regarding alcohol consumption, almost 29.9% of respondents were abstainer. This abstention was significantly more common among international (38.7%) than Hungarian participants (22.1%) ($p < 0.001$). Among those who consumed alcohol, 59.6% did so occasionally, with a higher prevalence observed among Hungarian (71.0%) compared to international participants (46.9%). A smaller percentage (10.5%) reported regular alcohol consumption, and a higher percentage of international students (14.4%) engaged in regular alcohol consumption compared to Hungarians (6.9%). Concerning sexual activity, the majority of respondents (52.9%) reported engaging in sexual intercourse. Interestingly, a higher percentage of Hungarian participants (58.3%) reported sexual activity compared to international participants (46.9%), and this difference was statistically significant ($p = 0.003$).

4.3. Health status and health behaviour of medical students by gender

Table 4 shows the chi-square tests to compare health status and behaviour by gender. Noteworthy findings included a significant gender difference in the prevalence of chronic diseases ($p = 0.011$) and BMI categories ($p < 0.001$). More specifically, females showed higher rates of chronic diseases and a lower proportion with BMI over 25kg/m^2 . Additionally, the PSS revealed a significant gender difference, indicating higher stress levels in females ($p = 0.001$). Smoking habits also differed significantly by gender ($p < 0.001$), with a higher percentage of males smoking regularly. Alcohol consumption patterns showed gender disparities ($p = 0.003$), and there was no significant gender difference in sexual intercourse rates. These findings

underscored gender-related variations in health status and behaviours, emphasizing the importance of gender-specific health considerations.

Table 4 Chi-square test to compare health status and health behaviour by gender.

Characteristics	Male (N=268)		Female (N=420)		p*
	N	%	N	%	
<i>General health status</i>					
Chronic disease					
No	236	88.1	339	80.7	0.011
Yes	32	11.9	81	19.3	
BMI					
≤ 24.9 kg/m ²	183	68.3	350	83.3	<0.001
≥ 25.0 kg/m ²	85	31.7	70	16.7	
Self-rated general health					
Good	188	70.1	272	64.8	0.143
Poor	80	29.9	148	35.2	
<i>Mental health status</i>					
Perceived stress scale					
Lower	229	85.4	316	75.2	0.001
Higher	39	14.6	104	24.8	
Self-rated mental health					
Good	143	53.4	195	46.4	0.076
Poor	125	46.6	225	53.6	
<i>Health behaviour</i>					
Smoking					
No	182	67.9	351	83.6	<0.001
Yes, occasionally	50	18.7	51	12.1	
Yes, regularly	36	13.4	18	4.3	
Alcohol consumption					
No	72	26.9	134	31.9	0.003
Yes, occasionally	155	57.8	255	60.7	
Yes, regularly	41	15.3	31	7.4	
Sexual intercourse					
No	129	48.1	195	46.4	0.662
Yes	139	51.9	225	53.6	

*The results from Chi-square tests.

Table 5 employed chi-square tests to compare healthcare-seeking behaviours by gender. Significant gender differences were observed in the frequency of visiting a specialist ($p = 0.038$) and visiting a psychologist ($p = 0.001$). Specifically, a higher proportion of females visited specialists and psychologists compared to males. No significant gender differences were found in visiting a GP or a dentist. These results highlight gender-related variations in healthcare-

seeking behaviours, emphasizing the need for gender-specific considerations in healthcare planning and delivery.

Table 5 Visiting health professionals by gender.

Characteristics	Male (N=268)		Female (N=420)		p*
	N	%	N	%	
<i>Healthcare-seeking</i>					
Visiting a GP					
No	121	45.1	176	41.9	0.402
Yes	147	54.9	244	58.1	
Visiting a dentist					
No	112	41.8	169	40.2	0.686
Yes	156	58.2	251	59.8	
Visiting a specialist					
No	180	67.2	249	59.3	0.038
Yes	88	32.8	171	40.7	
Visiting a psychologist					
No	238	88.8	332	79.0	0.001
Yes	30	11.2	88	21.0	

*The results from Chi-square tests.

4.4. Health status and health behaviour before and during the university

Table 6 displayed the results of McNemar tests comparing health status and behaviour before and during medical school among participants. Significant differences were found in chronic illness, self-rated general and mental health, and alcohol consumption ($p < 0.001$) for all. The proportion of participants reporting chronic illness and poor self-rated health increased during medical school. However, there was no significant change in BMI categories or smoking status. Notably, alcohol consumption significantly increased during medical school ($p = 0.011$). Sexual intercourse status remained consistent over the two periods ($p = 0.578$). The findings highlight shifts in health-related variables during medical school, emphasizing the impact on various aspects of students' well-being.

Table 7 presented the results of McNemar tests comparing visits to health professionals before and during medical school. Significant differences were found in all categories. During medical school, there was a substantial decreased in visits to GPs, dentists, specialists, and psychologists ($p < 0.001$) for all. The proportion of students visiting health professionals in these categories significantly dropped, highlighting a notable shift in healthcare utilization during the medical school period.

Table 6 Comparison of health status and health behaviour before and during medical school.

Before medical school	During medical school			p*
	N (%)	N (%)	N (%)	
<i>Health status</i>				
Chronic illness	No	Yes	Total	
No	565 (82.1)	36 (5.2)	601 (87.4)	<0.001
Yes	10 (1.5)	77 (11.2)	87 (12.6)	
Total	575 (83.6)	113 (16.4)	688 (100.0)	
Self-rated general health	Good	Poor	Total	
Good	438 (63.7)	98 (14.2)	536 (77.9)	<0.001
Poor	22 (3.2)	130 (18.9)	152 (22.1)	
Total	460 (66.9)	228 (33.1)	688 (100.0)	
Self-rated mental health	Good	Poor	Total	
Good	294 (42.7)	131 (19.0)	425 (61.8)	<0.001
Poor	44 (6.4)	219 (31.8)	263 (38.2)	
Total	338 (49.1)	350 (50.9)	688 (100.0)	
BMI	$\leq 24.9 \text{ kg/m}^2$	$\geq 25.0 \text{ kg/m}^2$	Total	
$\leq 24.9 \text{ kg/m}^2$	516 (75.0)	31 (4.5)	547 (79.5)	0.059
$\geq 25.0 \text{ kg/m}^2$	17 (2.5)	124 (18.0)	141 (20.5)	
Total	533 (77.5)	155 (22.5)	688 (100.0)	
<i>Health behaviour</i>				
Smoking	No	Yes	Total	
No	235 (72.11)	13 (4.0)	248 (76.1)	0.409
Yes	13 (4.0)	65 (19.9)	78 (23.9)	
Total	248 (76.1)	78 (23.9)	688 (100.0)	
Alcohol consumption	No	Yes	Total	
No	180 (26.2)	49 (7.1)	229 (33.3)	0.011
Yes	26 (3.8)	433 (62.9)	459 (66.7)	
Total	206 (29.9)	482 (70.1)	688 (100.0)	
Sexual intercourse	No	Yes	Total	
No	132 (40.5)	20 (6.1)	152 (46.6)	0.578
Yes	41 (12.6)	133 (40.8)	174 (53.4)	
Total	173 (53.1)	153 (46.9)	688 (100.0)	

*The results from McNemar tests.

Table 7 Comparison of visiting health professionals before and during medical school.

Before medical school	During medical school			p*
	N (%)	N (%)	N (%)	
<i>Visit the health professionals.</i>				
GPs	No	Yes	Total	<0.001
No	154 (22.4)	48 (7.0)	202 (29.4)	
Yes	143 (20.8)	343 (49.9)	486 (70.6)	
Total	297 (43.2)	391 (56.8)	688 (100.0)	
Dentists	No	Yes	Total	<0.001
No	103 (15.0)	22 (3.2)	125 (18.2)	
Yes	178 (25.9)	385 (56.0)	563 (81.8)	
Total	281 (40.8)	407 (59.2)	688 (100.0)	
Specialists	No	Yes	Total	<0.001
No	267 (38.8)	79 (11.5)	346 (50.3)	
Yes	162 (23.5)	180 (26.2)	342 (49.7)	
Total	429 (62.4)	259 (37.6)	688 (100.0)	
Psychologist	No	Yes	Total	<0.001
No	479 (69.6)	34 (4.9)	513 (74.6)	
Yes	91 (13.2)	84 (12.2)	175 (25.4)	
Total	570 (82.8)	118 (17.2)	688 (100.0)	

*The results from McNemar tests.

4.5. Healthcare-seeking behaviour of Hungarian and international students

In the total sample, there was a difference in the proportion of visits to the GP (56.8%) and the psychologist (17.2%); the number of visits to the psychologist was lower than visits to the GP (Table 8). Concerning visits to a GP, 43.2% of respondents reported no GP visits, with a consistent distribution between Hungarian (42.3%) and international (44.2%) participants, showing no statistically significant difference ($p=0.614$). From the total 56.8% had visited a GP, with a slightly higher percentage among Hungarian participants (57.7%) compared to international participants (55.8%), though not statistically significant.

Table 8 Healthcare-seeking behaviour of respondents by Hungarian and international medical students.

Characteristics	Total (688)		Hungarian (362)		International (326)		p*
	N	%	N	%	N	%	
<i>Healthcare-seeking</i>							
Visiting a GP							
No	297	43.2	153	42.3	144	44.2	0.614
Yes	391	56.8	209	57.7	182	55.8	
Visiting a psychologist							
No	570	82.8	290	80.1	280	85.9	0.045
Yes	118	17.2	72	19.9	46	14.1	

*The results from Chi-square tests.

In terms of visiting a psychologist, the majority (82.8%) have not sought the services (80.1% among Hungarian, 85.9% international participants); 17.2% visited a psychologist, and a slightly higher percentage of Hungarian participants (19.9%) sought psychological services compared to international participants (14.1%). A statistically significant difference was noted ($p=0.045$).

4.5.1. Medical students visit to the GP

Table 9 presents the results from univariable logistic regression analyses. In terms of socio-demographic factors, the age group 26–37 was showing a higher likelihood of GP visits in the total group, though not statistically significant. This trend was consistent among Hungarian and international participants. Being female did not significantly impact GP visits across all groups. Similarly, years of study, relationship status, and economic status did not show significant associations with GP visits.

Regarding health behaviours, smoking was exhibiting no significant influence on GP visits. However, alcohol consumption and sexual intercourse were significantly increasing the likelihood of GP visits, particularly among international participants. Individuals with chronic illnesses had a significantly higher likelihood of GP visits in all groups. A $BMI \leq 24.9$ kg/m² was associated with a lower likelihood of GP visits in the total group, with a similar trend among Hungarians, although not statistically significant.

Lastly, SRH as "poor" did not significantly impact GP visits across all participant groups. In summary, health behaviours (alcohol consumption and sexual intercourse), chronic illness, and BMI were exhibiting notable associations with GP visits, while other socio-demographic factors were showing no significant influence.

Table 9 Univariable logistic regression analysis of visiting a GP.

Characteristics	Total (N=688) OR (95% CI)	Hungarian (N=362) OR (95% CI)	International (N=326) OR (95% CI)
<i>Socio-demographic factors</i>			
Age (years)			
26–37	1.50 (0.95–2.37)	1.75 (0.83–3.68)	1.39 (0.77–2.52)
Sex			
Female	1.14 (0.83–1.55)	1.03 (0.66–1.60)	1.24 (0.80–1.92)
Years of study			
Clinical	1.15 (0.85–1.57)	1.01 (0.66–1.53)	1.34 (0.83–2.16)
Relationship status			
In a relationship	1.17 (0.86–1.61)	1.02 (0.67–1.55)	1.42 (0.85–2.37)
Economic status			
High income	0.91 (0.66–1.25)	0.79 (0.52–1.20)	1.13 (0.69–1.86)
<i>Health behaviours</i>			
Smoking			
Yes	0.99 (0.69–1.43)	0.97 (0.58–1.61)	1.03 (0.62–1.72)
Alcohol consumption			
Yes	1.48 (1.07–2.06) *	1.15 (0.70–1.90)	1.81 (1.16–2.85) *
Sexual intercourse			
Yes	1.50 (1.11–2.04) **	1.06 (0.69–1.61)	2.21 (1.41–3.45) **
<i>General health status</i>			
Chronic illness			
Yes	3.79(2.31–6.21) ***	3.85 (2.02–7.34) ***	3.70 (1.72–7.96) **
BMI			
≤ 24.9 kg/m ²	0.69 (0.47–0.99) *	0.56 (0.31–1.03)	0.75 (0.46–1.21)
Self-rated general health (SRH)			
Poor	1.18 (0.86–1.64)	0.73–1.77	1.24 (0.77–1.98)

*p<0.05; **p<0.01; ***p<0.001

OR: odds ratio, CI: confidence interval, BMI: body mass index

Reference categories: 18-25 years, male, preclinical years, not in a relationship, low income, not smoking, not consuming alcohol, not having sexual activity, not having chronic illness, ≥ 25.0 kg/m², good SRH.

Table 10 shows the adjusted odds ratios (AOR) with 95% confidence intervals from a multivariable logistic regression analysis on factors influencing medical students to visit a GP. Regarding health behaviours, alcohol consumption was not significantly impacting students for visiting GP for both Hungarian and international participants. While there were a marginal association between sexual intercourse and visiting GP, it is significant for international participants. In terms of general health status, individuals with chronic illnesses were significantly more likely to visit a GP across all groups. BMI groups showed no significant association with visiting GP in all groups.

Table 10 Multivariable logistic regression analysis of visiting a GP.

Characteristics	Total (688) AOR (95% CI)	Hungarian (362) AOR (95% CI)	International (326) AOR (95% CI)
<i>Health behaviours</i>			
Alcohol consumption			
Yes	1.26 (0.89–1.79)	1.07 (0.63–1.80)	1.37 (0.84–2.23)
Sexual intercourse			
Yes	1.35 (0.98–1.87)	1.04 (0.67–1.63)	1.86 (1.14–3.01) *
<i>General health status</i>			
Chronic illness			
Yes	3.50 (2.13–5.76) ***	3.70 (1.93–7.09) ***	3.22 (1.46–7.07) **
BMI			
$\leq 24.9 \text{ kg/m}^2$	0.78 (0.53–1.14)	0.62 (0.33–1.15)	0.95 (0.57–1.58)
Nagelkerke R ²	0.080	0.081	0.098
Hosmer and Lemeshow Test	p=0.577	p=0.768	p=0.257

*p<0.05; **p<0.01; ***p<0.001

AOR: adjusted odds ratio, CI: confidence interval, BMI: body mass index. Adjusting for socio-demographic factors (age, sex, years of study, relationship status, economic status).

Reference categories: not consuming alcohol, not having sexual activity, not having chronic illness, BMI $\geq 25.0 \text{ kg/m}^2$.

4.5.2. Medical students visit to the psychologist

The Table 11 presented the results of univariable logistic regression analyses examining the associations between various characteristics and the likelihood of visiting a psychologist among different groups (total, Hungarian, and international participants).

Socio-demographic factors: No significant association was found for the age group 26–37 compared to the reference category (18–25 years) in any of the groups with visiting a psychologist. Being female was significantly associated with an increased likelihood of visiting a psychologist among the total respondents (p=0.001), Hungarian participants (p=0.043), and international participants (p=0.022). Moreover, clinical years of study showed a marginally significant association to visiting a psychologist among Hungarian participants (p=0.009), but not in the total and international groups. There were no notable connections identified between relationship status and economic status concerning the likelihood of visiting a psychologist across all groups.

Health behaviours: Smoking was not associated with the likelihood of visiting a psychologist in any of the groups. The odds of visiting a psychologist were significantly higher for individuals who consume alcohol among the total respondents (p=0.024), but not among Hungarian and international participants analysed separately. No significant association was found between sexual intercourse and the likelihood of visiting a psychologist among any of the groups.

Mental health status: Having higher level of perceived stress was significantly associated with an increased likelihood of visiting a psychologist among all groups (total, Hungarian, and international participants). Poor perceived mental health was significantly associated with an increased likelihood of visiting a psychologist among all groups.

Table 11 Univariable logistic regression analysis of visiting a psychologist.

Characteristics	Total (688) OR (95% CI)	Hungarian (362) OR (95% CI)	International (326) OR (95% CI)
<i>Socio-demographic factors</i>			
Age (years)			
26–37	1.30 (0.75–2.26)	1.39 (0.62–1.11)	1.41 (0.65–3.04)
Sex			
Female	2.10 (1.35–3.29) **	1.87 (1.02–3.43) *	2.19 (1.12–4.28) *
Years of study			
Clinical	1.46 (0.98–2.19)	2.02 (1.19–3.42) **	0.74 (0.36–1.50)
Relationship status			
In a relationship	1.23 (0.82–1.84)	1.15 (0.68–1.92)	1.05 (0.52–2.15)
Economic status			
High income	0.93 (0.61–1.40)	1.07 (0.63–1.80)	0.89 (0.44–1.79)
<i>Health behaviours</i>			
Smoking			
Yes	1.02 (0.63–1.64)	1.19 (0.64–2.19)	0.86 (0.41–1.84)
Alcohol consumption			
Yes	1.73 (1.08–2.79) *	1.97 (0.96–4.05)	1.35 (0.70–2.63)
Sexual intercourse			
Yes	1.06 (0.71–1.58)	0.93 (0.55–1.57)	1.15 (0.61–2.15)
<i>Mental health status</i>			
PSS			
Higher	2.21 (1.43–3.43) ***	2.17 (1.24–3.79) **	2.11 (1.03–4.33) *
SRMH			
Poor	3.12 (2.01–4.83) ***	2.94 (1.67–5.18) ***	3.37 (1.68–6.77) **

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

OR: odds ratio, CI: confidence interval, PSS: perceived stress scale, SRMH: self-rated mental health

Reference categories: 18–25 years, male, preclinical years, not in a relationship, low income, not smoking, not consuming alcohol, not having sexual activity, lower PSS, good SRMH.

With regard to the multivariable analysis (Table 12), related to the socio-demographic factors, being female significantly increased the likelihood of psychologist visits in international students and total group. Among Hungarians, clinical years of study were associated with a higher likelihood of visiting psychologist, while this association was not statistically significant among internationals. Regarding health behaviours, alcohol consumption significantly increased the likelihood of visiting a psychologist in the total group, although not significantly among Hungarians and internationals individually. In terms of mental

health status, higher PSS significantly raised the odds of psychologist visits in the total group. Notably, having poor self-rated mental health significantly increased the odds of visiting a psychologist among both Hungarians and internationals.

Table 12 Multivariable logistic regression analysis of visiting psychologist.

Characteristics	Total (N=688) AOR (95% CI)	Hungarian (N=362) AOR (95% CI)	International (N=326) AOR (95% CI)
<i>Socio-demographic factors</i>			
Sex			
Female	1.98 (1.25–3.13) **	1.78 (0.95–3.35)	2.21 (1.11–4.41) *
Years of study			
Clinical	1.29 (0.85–1.95)	1.74 (1.00–3.01) *	0.70 (0.34–1.47)
<i>Health behaviours</i>			
Alcohol consumption			
Yes	1.71 (1.05–2.79) *	2.01 (0.96–4.23)	1.33 (0.67–2.64)
<i>Mental health status</i>			
PSS			
Higher	2.70 (1.68–4.33) ***	1.28 (0.68–2.41)	1.28 (0.59–2.76)
SRMH			
Poor	1.30 (0.80–2.11)	2.45 (1.31–4.60) **	3.08 (1.47–6.45) **
Nagelkerke R ²	0.109	0.118	0.108
Hosmer and Lemeshow Test	p=0.644	p=0.102	p=0.800

*p<0.05; **p<0.01; ***p<0.001

AOR: adjusted odds ratio, CI: confidence interval, BMI: body mass index, PSS: perceived stress scale, SRMH: self-rated mental health. Adjusting for socio-demographic factors (age, sex, years of study, relationship status, economic status).

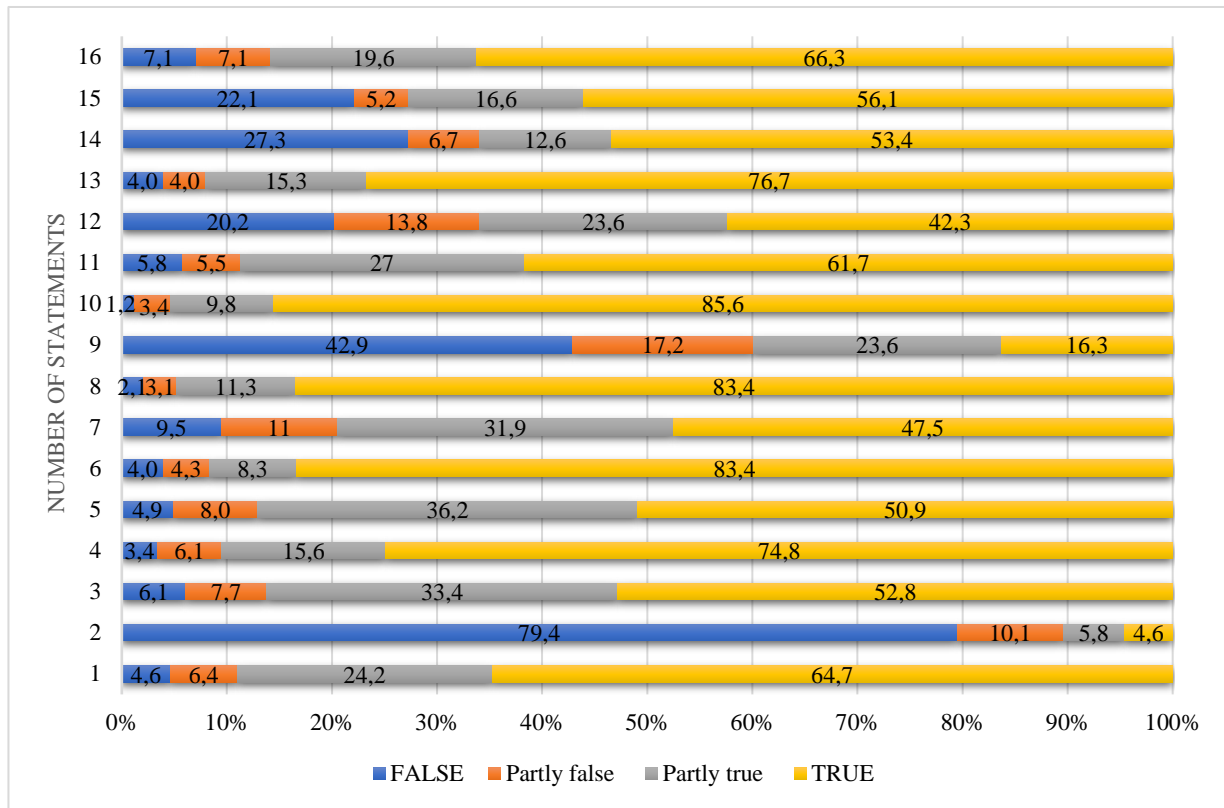
Reference categories: male, preclinical years, not consuming alcohol, lower stress, good SRMH

4.6. Acculturation of international medical students

4.6.1. Acculturation in general

The study measured acculturation along two dimensions (*Table 13*): the ESI score was 3.19 ± 0.47 , which reflects the extent to which an individual retains the values and practices of an ethnic group (home country), and the DSI score was 2.05 ± 0.57 , which reflects the extent to which an individual adopts the practices of the dominant society (host country). Most international students still prefer to speak in their native language and read and write in their native language in the ESI dimension (*Figure 1*). While on the DSI dimension, most students felt at home in Hungary, got information about current affairs in Hungary and felt accepted by Hungarians. However, their understanding of the Hungarian language was inadequate (*Figure 2*).

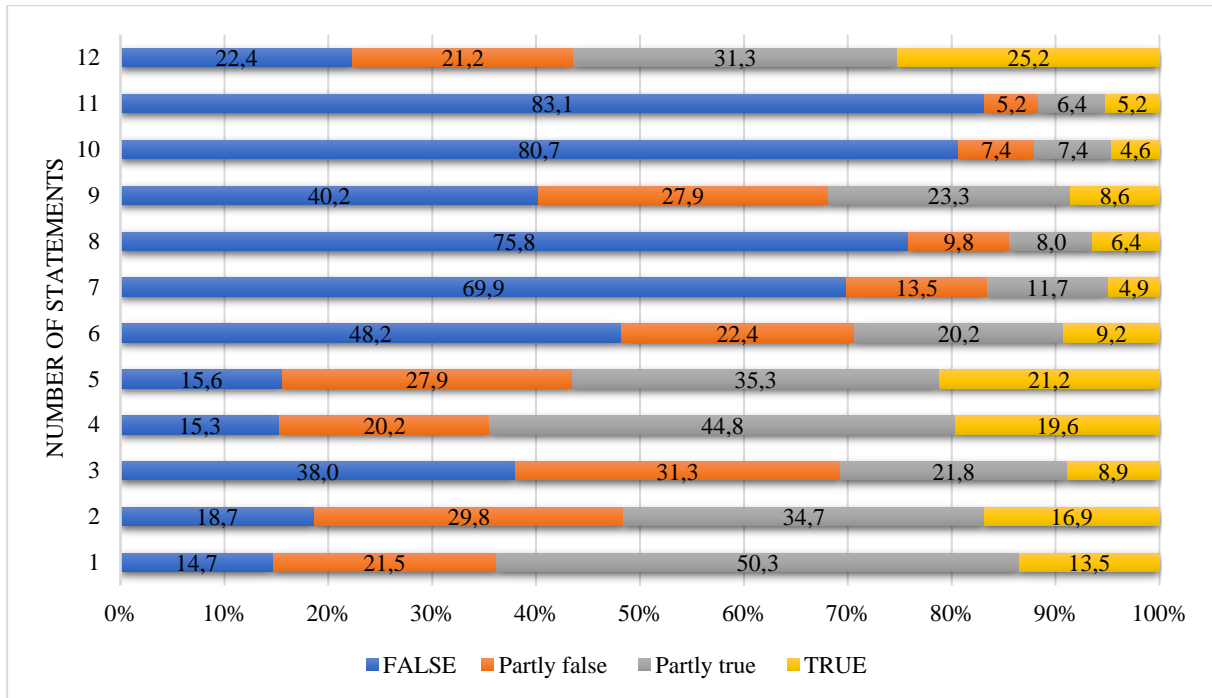
Figure 1 Distribution of answers for questions related to ethnic society immersion (N=326).



Serial number of statements

- 1 I speak my native language with my friends and acquaintances from my country of origin
- 2 I have never learned to speak the language of my native country
- 3 I eat traditional food from my native culture
- 4 I feel comfortable speaking my native language
- 5 I am informed about current affairs in my native country
- 6 I know how to read and write in my native language
- 7 I attend social functions with people from my native country
- 8 I speak my native language at home
- 9 I regularly read magazines of my ethnic group
- 10 I know how to speak my native language
- 11 I am familiar with the history of my native country
- 12 I like to listen to music of my ethnic group
- 13 I like to speak my native language
- 14 I speak my native language with my spouse or partner
- 15 When I pray, I use my native language
- 16 I stay in close contact with my family members and relatives in my native country

Figure 2 Distribution of answers for questions related to dominant society immersion (N=326)



Serial number of statements

- 1 I am informed about current affairs in Hungary.
- 2 I feel totally confident with Hungarian people.
- 3 I have many Hungarian acquaintances.
- 4 I feel home in Hungary.
- 5 I feel accepted by Hungarians
- 6 I know how to prepare Hungarian foods.
- 7 I regularly read a Hungarian newspaper.
- 8 I speak Hungarian at home.
- 9 I am familiar with important people in Hungarian history.
- 10 I think in Hungarian.
- 11 I speak Hungarian with my spouse or partner.
- 12 I like to eat Hungarian foods.

Table 13 Descriptive statistics of Stephenson Multigroup Acculturation Scale (SMAS) (N=326).

Acculturation domain	M	SD	Min-max	Range	Median (IQR)
Ethnic Society Immersion (ESI)	3.19	0.47	1-4	3	3.31 (3.00-3.50)
Dominant Society Immersion (DSI)	2.05	0.57	1-4	3	2.00 (1.67-2.33)

IQR: interquartile range, M: mean, SD: standard deviation

4.6.2. Acculturation categories

The analysis of ESI and DSI highlighted significant trends (*Table 14*). A substantial 96.9% of participants demonstrated a high ESI score (≥ 3.19), indicating a strong connection to their ethnic society. In contrast, only 3.1% showed a low ESI score (< 3.19), suggesting limited engagement with their ethnic community. Regarding DSI, there was a balanced distribution, with 53.7% in the low category (score < 2.05) and 46.3% in the high category (score ≥ 2.05), reflecting a diverse range of attitudes toward assimilation into the dominant society.

Table 14 Dichotomy of ESI and DSI.

Characteristics	Total (326)	
	N	%
ESI		
Low (score < 3.19)	10	3.1
High (score ≥ 3.19)	316	96.9
DSI		
Low (score < 2.05)	175	53.7
High (score ≥ 2.05)	151	46.3

Table 15 The two-dimensional acculturation models.

Ethnic society immersion	Dominant society immersion	
	Low	High
High	Separation 166 (50.9%)	Integration 150 (46.0%)
Low	Marginalization 9 (2.8%)	Assimilation 1 (0.3%)

The *Table 15* displayed the distribution of individuals based on their levels of ESI and DSI, resulting in four categories. *Separation* (50.9%): many individuals, characterized by high ESI, preferred to maintain some level of separation from the dominant community. *Integration* (46.0%): another substantial group in this category actively embraced integration, indicating a strong connection to both the dominant and ethnic societies. *Marginalization* (2.8%): a smaller percentage of individuals with low DSI experienced marginalization, reflecting a reduced connection to both dominant and ethnic societies. *Assimilation* (0.3%): an even smaller subset tended to assimilate, showing a preference for the dominant society over their ethnic identity.

4.6.3. Acculturation and the associated factors

Table 16 Socio-demographic factors and health behaviours that influence acculturation.

Characteristics	ESI		p*	DSI		p*
	Low N (%)	High N (%)		Low N (%)	High N (%)	
<i>Socio-demographic factors</i>						
Age (years)						
18–25	9 (3.3)	261 (96.7)	0.541	147 (54.4)	123 (45.6)	0.544
26–37	1 (1.8)	55 (98.2)		28 (50.0)	28 (50.0)	
Sex						
Male	4 (2.6)	147 (97.4)	0.684	71 (47.0)	80 (53.0)	0.025
Female	6 (3.4)	169 (96.6)		104 (59.4)	71 (40.6)	
Years of study						
Preclinical	4 (1.8)	220 (98.2)	0.047	111 (49.6)	113 (50.4)	0.027
Clinical	6 (5.9)	96 (94.1)		64 (62.7)	38 (37.3)	
Country of origin						
Non-European	9 (4.5)	189 (95.5)	0.054	116 (58.6)	82 (41.4)	0.027
European	1 (0.8)	127 (99.2)		59 (46.1)	69 (53.9)	
Relationship status						
Not in a relationship	10 (4.1)	234 (95.9)	0.063	135 (55.3)	109 (44.7)	0.304
In a relationship	0 (0.0)	82 (100.0)		40 (48.8)	42 (51.2)	
Economic status						
Low income	5 (5.8)	81 (94.2)	0.085	46 (53.5)	40 (46.5)	0.967
High income	5 (2.1)	235 (97.9)		129 (53.8)	111 (46.3)	
Ethnic minority						
No	6 (2.2)	272 (97.8)	0.022	148 (53.2)	130 (46.8)	0.699
Yes	4 (8.3)	44 (91.7)		27 (56.3)	21 (43.8)	
<i>Health behaviour</i>						
Smoking						
No	5 (2.0)	243 (98.0)	0.142	137 (55.2)	111 (44.8)	0.159
Yes, occasionally	3 (6.8)	41 (93.2)		25 (56.8)	19 (43.2)	
Yes, regularly	2 (5.9)	32 (94.1)		13 (38.2)	21 (61.8)	
Alcohol consumption						
No	5 (4.0)	121 (96.0)	0.550	61 (48.4)	65 (51.6)	0.206
Yes, occasionally	3 (2.0)	150 (98.0)		90 (58.8)	63 (41.2)	
Yes, regularly	2 (4.3)	45 (95.7)		24 (51.1)	23 (48.9)	

ESI: Ethnic Society Immersion, DSI: Dominant Society Immersion

*The results from Chi-square tests.

The bivariate analysis of socio-demographic factors and health behaviours influencing acculturation, as measured by ESI and DSI, revealed several key findings (Table 16). While age did not show significant differences in ESI and DSI, gender played a notable role, with males showing higher DSI scores. Years of study were associated with both higher ESI and DSI, particularly among preclinical students. Participants from European countries demonstrated significantly higher high scores in DSI. Relationship status and economic status did not show

significant associations with ESI or DSI groups, highlighting the independence of acculturation from these factors. Ethnic minority status, however, significantly associated with ESI, indicating lower immersion levels among ethnic minorities. Lastly, health behaviours such as smoking, and alcohol consumption did not exhibit significant associations with either ESI or DSI.

Table 17 Multivariable logistic regression analysis of socio-demographic factors and health behaviours that influence acculturation.

Variables	High ESI AOR (95% CI)	p	High DSI AOR (95% CI)	p
<i>Socio-demographic factors</i>				
Age				
26–37	3.67 (0.35-37.52)	0.273	1.47 (0.79-2.75)	0.221
Gender				
Female	0.44 (0.09-2.11)	0.310	0.77 (0.36-0.92)	0.021
Year of study				
Clinical	0.13 (0.02-0.68)	0.016	0.62 (0.36-1.08)	0.094
Country of origin				
European	1.04 (0.09-11.71)	0.971	1.69 (0.97-2.94)	0.060
Relationship status				
In relationship	7.80 (0.01-11.11)	0.996	1.47 (0.84-2.57)	0.172
Economic status				
High income	4.45 (0.88-22.42)	0.070	0.85 (0.50-1.45)	0.561
Ethnic minority				
Yes	0.10 (0.02-0.59)	0.011	0.92 (0.47-1.80)	0.820
<i>Health behaviour</i>				
Smoking				
No smoking	Ref	0.019	Ref	0.056
Yes, occasionally	0.04 (0.01-0.38)	0.005	1.02 (0.51-2.06)	0.942
Yes, regularly	0.56 (0.07-4.32)	0.582	2.72 (1.19-6.20)	0.017
Alcohol consumption				
No alcohol	Ref	0.096	Ref	0.021
Yes, occasionally	6.57 (0.93-46.57)	0.059	0.49 (0.28-0.83)	0.009
Yes, regularly	0.42 (0.05-3.68)	0.440	0.46 (0.21-1.01)	0.051
Nagelkerke R ²	0.330		0.104	
Hosmer and Lemeshow Test	$\chi^2=4.713$, df=8, P=0.788		$\chi^2=12.178$, df=8, P=0.143	

AOR: adjusted odds ratio, CI: confidence interval, ESI: Ethnic Society Immersion, DSI: Dominant Society Immersion

Reference categories: Age 18-25 years, male, preclinical years, non-European, not in relationships, average income, no ethnic minority, no smoking, no consuming alcohol.

Multivariable logistic regression analysis showed that females were less likely to have high DSI (*Table 17*). Clinical years students were less likely to be involved in maintaining the culture and society of their origin. However, no significant association was observed for high DSI according to the years of study. Being an ethnic minority significantly decreased the odds

of high ESI. This suggested that individuals from ethnic minority backgrounds may experience less engagement or identification with their own ethnic community compared to those who were not classified as ethnic minorities in the study. For smoking habits, there was a significant relationship between smoking behaviour and high ESI, where the occasional smokers were less likely to have a strong immersion in their ethnic society compared to non-smokers. Meanwhile, regular smokers were more likely to have high DSI. Regarding alcohol consumption, individuals who consume alcohol occasionally were less likely to have a strong dominant society immersion.

4.6.4. Acculturation and self-rated health of international medical students

Table 18 showed the univariable and multivariable logistic regression analyses of self-rated general health. The analysis of ESI and DSI in relation to self-rated general health revealed insightful patterns. ESI demonstrated an important protective effect against poor general health, as evidenced by a statistically significant unadjusted odds ratio (UAOR) of 0.50 (95% CI: 0.31–0.81, $p=0.005$). This effect persisted even after adjusting for potential confounding factors, with an adjusted odds ratio (AOR) of 0.51 (95% CI: 0.30–0.87, $p=0.014$). This suggests that individuals who immersed themselves more in their ethnic society tended to have a lower likelihood of reporting poor general health.

In contrast, DSI also showed a significant association, with a UAOR of 0.60 (95% CI: 0.39–0.94, $p=0.024$). However, the protective effect was less pronounced after adjusting for confounding variables, resulting in an AOR of 0.69 (95% CI: 0.43–1.11, $p=0.124$). While DSI demonstrated a positive influence on general health, the magnitude of the effect was somewhat reduced when considering other factors.

These findings underscored the differential relationship between acculturation, specifically ESI and DSI, and self-rated general health. The analysis suggested that a stronger connection to one's ethnic society, as measured by ESI, may play a more robust role in promoting better general health compared to immersion in the dominant society, as indicated by DSI.

Table 18 Univariable and multivariable logistic regression analysis of sociodemographic, acculturation and self-rated general health (poor general health).

Variables	Poor general health			
	UAOR (95% CI)	p	AOR (95% CI)	p
ESI (mean score)	0.50 (0.31-0.81)	0.005	0.51 (0.30-0.87)	0.014
DSI (mean score)	0.60 (0.39-0.94)	0.024	0.69 (0.43-1.11)	0.124
Age	1.06 (0.98-1.14)	0.183	1.08 (0.99-1.18)	0.103
Gender				
Male	Ref		Ref	
Female	1.41 (0.89-2.26)	0.148	1.43 (0.87-2.34)	0.155
Year of study				
Preclinical	Ref		Ref	
Clinical	1.36 (0.83-2.23)	0.218	0.94 (0.52-1.70)	0.849
Country of origin				
Non-European	Ref		Ref	
European	0.67 (0.41-1.09)	0.109	0.79 (0.45-1.40)	0.428
Relationship status				
Not in a relationship	Ref		Ref	
In relationship	1.03 (0.60-1.75)	0.927	1.16 (0.65-2.08)	0.617
Economic status				
Low income	Ref		Ref	
High income	0.70 (0.42-1.17)	0.177	0.79 (0.46-1.37)	0.411
Ethnic minority				
No	Ref		Ref	
Yes	1.29 (0.69-2.45)	0.425	1.08 (0.55-2.12)	0.824

UAOR: unadjusted odds ratio; AOR: adjusted odds ratio; 95% CI: 95% confidence interval; ESI: Ethnic Society Immersion, DSI: Dominant Society Immersion

In case of adjusted model: Hosmer–Lemeshow goodness of fit test $\chi^2=7.067$, $df=8$, $p=0.529$.

Table 19 demonstrates the univariable and multivariable logistic regression analyses of poor self-rated mental health. The UAOR was 0.53 (95% CI: 0.33–0.87, $p=0.012$), suggesting that higher ESI was associated with lower odds of poor mental health. However, in the adjusted model, the association (AOR=0.64, 95% CI: 0.38–1.08, $p=0.100$) was not statistically significant. In simpler terms, individuals who were more connected or involved in their ethnic society were less likely to experience poor mental health. However, it is important to note that, in the adjusted model, the evidence supporting this protective effect was not strong enough to be statistically significant. Similar to ESI, the analysis revealed a significant inverse relationship between DSI and poor mental health. The UAOR was 0.52 (95% CI: 0.34–0.78, $p=0.002$), indicating lower odds of poor mental health with higher DSI. This association remained significant in the adjusted model (AOR=0.52, 95% CI: 0.34–0.82, $p=0.004$). In this case, the adjusted model confirmed a significant protective effect of DSI against poor mental health.

Table 19 Univariable and multivariable logistic regression analysis of sociodemographic, acculturation and self-rated mental health (poor mental health).

Variables	Poor mental health			
	UAOR (95% CI)	p	AOR (95% CI)	p
ESI (mean score)	0.53 (0.33-0.87)	0.012	0.64 (0.38-1.08)	0.100
DSI (mean score)	0.52 (0.34-0.78)	0.002	0.52 (0.34-0.82)	0.004
Age	0.96 (0.89-1.04)	0.302	0.98 (0.89-1.07)	0.615
Gender				
Male	Ref		Ref	
Female	1.16 (0.75-1.80)	0.500	1.08 (0.68-1.71)	0.743
Year of study				
Preclinical	Ref		Ref	
Clinical	0.96 (0.60-1.54)	0.870	0.81 (0.46-1.43)	0.474
Country of origin				
Non-Europe	Ref		Ref	
Europe	0.83 (0.53-1.30)	0.413	0.99 (0.59-1.68)	0.978
Relationship status				
Not in a relationship	Ref		Ref	
In relationship	1.16 (0.70-1.91)	0.565	1.48 (0.85-2.57)	0.168
Economic status				
Low income	Ref		Ref	
High income	0.81 (0.50-1.33)	0.412	0.79 (0.47-1.36)	0.407
Ethnic minority				
No	Ref		Ref	
Yes	2.05 (1.08-3.87)	0.025	1.97 (0.99-3.87)	0.051

UAOR: unadjusted odds ratio; AOR: adjusted odds ratio; 95 % CI: 95 % confidence interval; ESI: Ethnic Society Immersion, DSI: Dominant Society Immersion

In case of adjusted model: Hosmer–Lemeshow goodness of fit test $\chi^2=7.038$, df=8, p=0.533

5. Discussion

5.1. Health status and health behaviour of Hungarian and international students

According to the findings of our study, 32.5% of international medical students reported having poor general health. Meanwhile, nearly half of the students reported having poor mental health. These results are consistent with the findings of Ochnik et al. (2021), who have found that the prevalence of mental health problems in university students is high, with the prevalence of high stress, depression, and generalized anxiety symptoms in the total sample being 61.30%, 40.3%, and 30%, respectively (Ochnik et al., 2021). Furthermore, international students reported higher rates of depression, suicidal ideation, anxiety, post-traumatic stress disorder (PTSD), academic stress, and loneliness (Kivelä et al., 2022). Several studies show that tertiary education students have a higher incidence of mental health problems than the general population, and that international students have higher levels of anxiety than domestic students (Forbes-Mewett & Sawyer, 2016).

Our study suggested that there was no significant difference in smoking behaviour between Hungarian and international students. Whereas other findings state that there were significant differences in the prevalence of cigarette smoking between the various groups of medical students from different countries. A study found that the lowest prevalence of cigarette smoking was found among students from Norway (13.0%) when compared with students from Hungary (21.5%), Germany (34.2%), or with students in the Multinational group (29.5%) (Balogh et al., 2021).

Previous research showed similar exposure to Anti-Smoking Campaigns that both domestic and international students may have been equally exposed to anti-smoking campaigns, educational programs, or policies, leading to a convergence in smoking behaviour (Chauhan & Sharma, 2017; Kim et al., 2023; Megatsari et al., 2023). Furthermore, similar socioeconomic factors that influence smoking behaviour (such as economic status, access to healthcare, etc.), this could contribute to the lack of a significant difference (Choquet et al., 2021).

Alcohol consumption and sexual activity differed significantly between the two groups. Another study conducted in Hungary stated that nearly one-third of the students were classified as binge drinkers, significantly more male university students (Lukács et al., 2021). This research was supported by previous research which states that alcohol intake is higher than that of their peers not attending universities, as well as the general adult population (Gajda et al., 2021).

Other study from Lukács showed that 28.1% of the students showed risky alcohol consumption (Lukács, 2023). Variations in sociodemographic factors, such as age, gender, and socioeconomic status, between Hungarian and international students may also contribute to differences in alcohol consumption and sexual activity (Skromanis et al., 2018). Cultural differences in the stigma associated with certain behaviours may influence reporting. International students may be more or less inclined to disclose their behaviours based on cultural norms and expectations, leading to reporting bias (Riemenschneider et al., 2016).

5.2. Healthcare-seeking behaviour of Hungarian and international students

The findings revealed that medical students' utilization of medical assistance from GPs or psychologists remained low, aligning with similar observations made in other studies (Brimstone et al., 2007; Chew-Graham et al., 2003). Medical students may feel they have the knowledge to overcome their health problems by seeking help from friends or family members (Amarasuriya et al., 2015; Shahaf-Oren et al., 2021). The same opinion has been expressed in a study that students tend to avoid or delay disclosure, and they seek help because of the perceived risk to their future (Hooper et al., 2005; Roberts et al., 2001). Meanwhile, in another study, it has been suggested that the reason for coming to professional healthcare was not because it would hinder the students' studies or reduce their achievement because of the disease they were having (Brimstone et al., 2007), but they were reluctant to come to the GP for reasons of the type and level of the disease they were experiencing (Bhandari & Chatau, 2020; Shahaf-Oren et al., 2021).

Our study showed that both Hungarian and international medical students who had chronic illnesses had the possibility to visit the GP. This finding was supported by a study which stated that students had symptoms of chronic diseases, such as respiratory, gastrointestinal, musculoskeletal symptoms or miscellaneous would come to visit the GP (Bhandari & Chatau, 2020). The same thing has also been described by previous studies which stated that health seeking behaviour among medical students might be influenced by the presence or absence of chronic diseases the students had (Sawalha, K. et al., 2017). However, another study claims that only students with symptoms of the disease at a severe stage would come to seek medical assistance (Ajaegbu & Uboch, 2016; Roberts et al., 2000).

Likewise, students who often engage in risky health behaviours would have an impact on their physical and mental health, so that these students need appropriate health assistance (Stecker, 2004). The current findings suggest that international medical students who were sexually active were more likely to visit a GP. Hobbs (2019) reports in his research that family

doctors are the most common providers of support (47.5% to 54.8%), less than half of the individuals experiencing unpleasant sexual difficulties sought help or advice to health professionals (Hobbs et al., 2019). The primary obstacle to students seeking medical care (70.4%) and students in need of sexual health counselling (72.2%) was acceptance of services (Boltana et al., 2012).

The findings of the current study show that students were less likely to come to the psychologist than to the GP. This is of particular concern even though 50.9% of the students reported experiencing poor mental health, they were reluctant to come for psychological help. This might be influenced by the stigmatization of students when they have poor mental health problems (Hussain et al., 2013). Worries about confidentiality were only seen as a barrier to seeking help for mental health problems (Shahaf-Oren et al., 2021) to consult friends and family informally about symptoms relating to mental health problems (Brimstone et al., 2007).

A prior study has revealed that men and women exhibit comparable help-seeking behaviours (Meza, 2023). However, in the current study, it was observed that female students were more likely to seek the advice of a psychologist, and this finding was also present in the study of Mou, that is, women were more likely than men to take precautions (Mou et al., 2022; Sagar-Ouriaghli et al., 2020). The likelihood of contracting a disease, how well people respond to treatments, and how frequently they seek medical attention have all been found to be influenced by sex and social circumstances (Harrison, 2016). Another study has claimed that patients' self-reports revealed gender variations in the way they sought medical attention with women saying they contacted their primary care physician more frequently than males for both physical and mental health issues (Sagar-Ouriaghli et al., 2020; Thompson et al., 2016).

The study conducted by Sawaha highlights that the academic year affects the search for health assistance (Sawalha, K. et al., 2017) similarly to the findings in the current study where clinical students tried to seek help for psychological problems more often by consulting a psychologist. Students in higher academic years had a higher probability to be in the risk pattern of burnout, so they needed to come to the psychologist more often (Afshar et al., 2022). In addition, the study found a link between psychological visits and perceived stress, and prior research indicated that medical students generally experienced greater levels of perceived stress and emotional distress (Afshar et al., 2022). A more thorough understanding of how various sorts of stressors affect college students' mental health will certainly allow any such efforts to identify and offer options to those who need support more accurately (Hubbard et al., 2018).

The recent findings argue that alcohol consumption was associated with seeking help from a psychologist. Consequently, drinking issues may have a very negative effect on mental health.

One recent study showed that drinking alcohol were more likely to have mental health problems (Wang et al., 2022). Excessive alcohol consumption and alcoholism can exacerbate pre-existing disorders like depression, or they may lead to the development of new issues, such as anxiety, depression or significant memory loss (Dahlin et al., 2011).

5.3. Acculturation and the associated factors

Multivariable logistic regression analysis showed that males had a significant association with increased odds of 'high DSI, indicating a higher tendency for immersion in the dominant society. Gender roles play a significant role in acculturation processes, with differences in gender role socialization impacting how individuals experience acculturation (Kulis et al., 2007). The other study by Castillo (2015) showed that the adoption of cultural practices may lead female students to discard traditional gender roles, potentially affecting family cohesion and increasing the risk for depression (Castillo et al., 2015). A study has shown that individuals with high DSI scores are more likely to seek formal and informal support, which may contribute to their increased immersion in the dominant society. This aligns with the findings that those with integrated and assimilated acculturation types, characterized by higher DSI, tend to access more support compared to those with low DSI scores (Das, 2022).

From this study shows that clinical year's students were less likely to be involved in maintaining the culture and society of their origin. Other research also suggests that clinical students more focused on developing their professional identity as healthcare practitioners, enabling them to connect with patients from various backgrounds and deliver compassionate care. With adequate support, these students can build successful careers as physicians (Okorie, 2023). On the other hands, in their first year of medical school, students navigate complex roles as university students, medical students, and future doctors. A six-group typology identifies challenges like wrong degree choice, mental health issues, crises, capacity issues, slow starters, and reliance on family support. Many students face multifaceted struggles, with mental health problems and crises being common (Picton et al., 2022).

Being an ethnic minority significantly decreased the odds of high ESI. A study in China stated that perceived discrimination was negatively associated with sociocultural and psychological adaptation among international students in China. This study explores the associations between perceived discrimination and cross-cultural adaptation among 335 international students in China. Drawing on self-determination theory, study propose that autonomous orientation can weaken the relationship between perceived discrimination and cross-cultural adaptation (Yang et al., 2023). Some ethnic minorities may face challenges in

integrating into their ethnic society due to factors such as language barriers, discrimination, or lack of community support (Areba et al., 2021).

Study revealed that the occasional smokers were less likely to have a strong immersion in their ethnic society compared to non-smokers. Smoking is generally associated with health risks, and individuals who engage in this behaviour might adopt a lifestyle that differs from traditional cultural practices, potentially leading to reduced immersion in their ethnic society (Bandiera et al., 2018). Others study stated that smoking is often influenced by social factors and peer pressure. Individuals who smoke might find themselves associating more with peers who share similar habits, potentially leading to reduced involvement in ethnic community activities (Fu et al., 2003).

Regarding alcohol consumption, individuals who consume alcohol occasionally were less likely to have a strong dominant society immersion. The acceptance and frequency of alcohol consumption vary across cultures. In some societies, drinking may be a common social practice, and individuals who partake may feel more aligned with the host culture's norms (Bandiera et al., 2018; Lukács et al., 2021). Different cultures may have varying attitudes and norms regarding health-risk behaviours such as smoking, alcohol consumption, diet, and physical activity. Acculturation may influence an individual's alignment with these cultural norms, impacting their health-related choices (Bandiera et al., 2018; Fu et al., 2003).

5.4. Acculturation and self-rated health of international medical students

Our current research divided acculturation into two dimensions: on the one hand, dominant society immersion, in which students can meet and interact with the host country's society, culture, beliefs, and attitudes, and on the other hand, ethnic society immersion, in which students can maintain cultural values and heritage from their home country. Studies have revealed a connection between acculturation and a range of adaptation-related outcomes in immigrant populations, such as alcohol consumption, psychological help-seeking behaviors, and depression (Deslandes et al., 2024; Tang & Zhang, 2023; Zhang & Zeng, 2023).

Specifically, we investigated the association between acculturation and general and mental health, after controlling for all covariates. Our findings suggest that high ethnic society immersion, in which students retain their ethnic group's values and practices (home country), tends to decrease the poor general health status. This is consistent with the findings of Suleiman et al. (2021), who have discovered that greater heritage identity is associated with a lower risk of poor self-rated health (Suleiman et al., 2021). Meanwhile, research conducted among Asian

immigrant groups has found that the separated are significantly more likely than the assimilated to report poor-to-fair SRH (Kim & Gorman, 2022).

In addition, we discovered that dominant society immersion had no significant relationship with self-rated general health. Meanwhile, Wang's study describes that acculturation is associated with a higher likelihood of reporting excellent or good health among older Chinese Americans. Other studies have argued that acculturation was a risk factor for SRH (Eliassen et al., 2012; Johnson et al., 2010); a study conducted by Johnson et al. (2010) has used Andersen's socio-behavioural approach, which allows for a better understanding of how acculturation affects health status by systematically evaluating a group of determinants and their impact on SRH, and the findings have pointed at that Mexican-oriented acculturation remains an independent predictor of fair/poor health (Johnson et al., 2010).

The current study found that high levels of dominant society immersion was associated with a lower risk of poor mental health. The majority of international students felt accepted by Hungarians and received information about current events in Hungary. This might reduce students' feelings of loneliness in a new environment.

The results of our study seem to be consistent with the findings of a systematic review, which has discussed that marginalization had the most negative effects on the mental health of migrant populations, while integration had the most positive effects. The study also identifies three major sources of acculturation stress and poor mental health, such as a lack of education or skill set, a lack of proficiency in the host country's language, and financial difficulties (Choy et al., 2021).

According to some theories, acculturation can help with everyday social interactions (Chun et al., 2003; Organista et al., 2004). Nonetheless, acculturation can increase stress or conflict between two competing cultures (Pourmand et al., 2021) or be associated with decreased social support (Deslandes et al., 2024; Hyung-Chul et al., 2015; Zhang & Zeng, 2023). Not surprisingly, empirical findings have been mixed, with some studies linking higher acculturation to a new culture to poorer SRH (Eliassen et al., 2012; Johnson et al., 2010), while others show favorable relationship to mental health (Kim & Gorman, 2022; Wang et al., 2021) or no relationship at all (Suleiman et al., 2021).

5.5. Limitations of study

In this study, health issues concerning both general health and mental health were discussed by using self-rated health assessments that are easy to assess by respondents and do not require much time in answering questionnaires. As another strength of the survey, a

perceived stress scale that is easily understood by respondents in assessing the perception of stress was used.

Nevertheless, despite the use of valid measurements and online survey measure, this study has several limitations. First, the cross-sectional study design may cause result bias. Thus, preventing the authors from drawing causal conclusions. Self-rated health possibly influences acculturation. Whereas the general health status and low mental health will affect the acculturation process in international students. Third, this study used a non-probability sampling; thus, the sample might not be representative. Fourth, since the data collection was conducted during the COVID-19 pandemic in Hungary, it may have an impact on health status (including mental health) and healthcare-seeking behaviours of students.

6. Conclusion

In conclusion, healthcare-seeking behaviour among medical students is intricately linked to socio-demographic characteristics, health behaviour, and existing health issues. This underscores the need for medical schools to foster an environment that encourages students to seek assistance early and promotes awareness to minimize risky behaviours. A medical student's future career success hinges not only on patient care but also on their ability to comprehend healthcare attitudes, develop solutions to improve health behaviour, and access appropriate healthcare resources.

Furthermore, our study highlights the intricate relationship between acculturation and self-health assessment. Recognizing the impact of acculturation on the general and mental health of these special populations is crucial. Given the rarity of research focusing on the international student population, our results provide valuable insights for improving the health of international students during their university studies. These findings aim to inspire future research on the psychosocial determinants of self-rated health among international students and advocate for culturally sensitive services and enhanced social support to benefit their overall well-being.

Future studies should consider using longitudinal study design, mixed method (qualitative and quantitative), dig deeper into the reasons why students seek medical assistance other than the variables in this study. The reasons why students visit psychology less frequently than to the GP can be explored by in-depth interviews. Future researchers can explore the barriers to seeking help among medical students. Finally, we did not measure acculturation stress in this study, which is an important factor in poor health outcomes.

New contributions to academic knowledge:

1. Females and especially foreign female medical students have the biggest risk mentally, they visit psychologist more often than other subgroups.
2. Drinking alcohol is part of the students' life (70.1%, 482 students), but just 10.5% (72 students) drinks regularly. Alcohol dinking behaviour is more typical among the students who visit a psychologist.
3. Higher perceived stress and poor self-rated mental health are significantly associated with visiting a psychologist in the total student population.
4. The study indicates a decline in overall health and health behaviour among students during their university years. There is an increase in the prevalence of chronic illnesses and a negative shift in perceptions of general and mental health. Seeking professional help decreased, and alcohol consumption rose. Smoking rates remained stable.
5. From the point of acculturation, both types of immersion can affect the students' SRH. If the student could integrate better into their own ethnic group, their general health was better, and if they could strongly integrate into the Hungarian society, their mental health was more favourable.

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Appendix

Supplementary table

Descriptive Statistics for the Stephenson Multigroup Acculturation Scale (SMAS)

N o	Items	M±SD	False n (%)	Partly false n (%)	Partly true n (%)	True n (%)
1	I speak my native language with my friends and acquaintances from my country of origin (n=326)	3.49±0.81	15 (4.6)	21 (6.4)	79 (24.2)	211 (64.7)
2	I have never learned to speak the language of my native country (n=326)	1.36±0.79	259 (79.4)	33 (10.1)	19 (5.8)	15 (4.6)
3	I eat traditional food from my native culture (n=326)	3.33±0.86	20 (6.1)	25 (7.7)	109 (33.4)	172 (52.8)
4	I feel comfortable speaking my native language (n=326)	3.62±0.75	11 (3.4)	20 (6.1)	51 (15.6)	244 (74.8)
5	I am informed about current affairs in my native country (n=326)	3.33±0.82	16 (4.9)	26 (8.0)	118 (36.2)	166 (50.9)
6	I know how to read and write in my native language (n=326)	3.71±0.72	13 (4.0)	14 (4.3)	27 (8.3)	272 (83.4)
7	I attend social functions with people from my native country (n=326)	3.17±0.96	31 (9.5)	36 (11.0)	104 (31.9)	155 (47.5)
8	I speak my native language at home (n=326)	3.76±0.61	7 (2.1)	10 (3.1)	37 (11.3)	272 (83.4)
9	I regularly read magazines of my ethnic group (n=326)	2.13±1.14	140 (42.9)	56 (17.2)	77 (23.6)	53 (16.3)
10	I know how to speak my native language (n=326)	3.80±0.55	4 (1.2)	11 (3.4)	32 (9.8)	279 (85.6)
11	I am familiar with the history of my native country (n=326)	3.44±0.84	19 (5.8)	18 (5.5)	88 (27.0)	210 (61.7)
12	I like to listen to music of my ethnic group (n=326)	2.88±1.16	66 (20.2)	45 (13.8)	77 (23.6)	138 (42.3)
13	I like to speak my native language (n=326)	3.65±0.74	13 (4.0)	13 (4.0)	50 (15.3)	250 (76.7)
14	I speak my native language with my spouse or partner (n=326)	2.92±1.30	89 (27.3)	22 (6.7)	41 (12.6)	174 (53.4)
15	When I pray, I use my native language (n=326)	3.07±1.22	72 (22.1)	17 (5.2)	54 (16.6)	183 (56.1)
16	I stay in close contact with my family members and relatives in my native country (n=326)	3.45±0.90	23 (7.1)	23 (7.1)	64 (19.6)	216 (66.3)
17	I am informed about current affairs in Hungary (n=326)	2.63±0.89	48 (14.7)	70 (21.5)	164 (50.3)	44 (13.5)
18	I feel totally confident with Hungarian people (n=326)	2.50±0.98	61 (18.7)	97 (29.8)	113 (34.7)	55 (16.9)
19	I have many Hungarian acquaintances (n=326)	2.02±0.97	124 (38.0)	102 (31.3)	71 (21.8)	29 (8.9)
20	I feel home in Hungary (n=326)	2.69±0.95	50 (15.3)	66 (20.2)	146 (44.8)	64 (19.6)
21	I feel accepted by Hungarians (n=326)	2.62±0.98	51 (15.6)	91 (27.9)	115 (35.3)	69 (21.2)
22	I know how to prepare Hungarian foods (n=326)	1.90±1.02	157 (48.2)	73 (22.4)	66 (20.2)	30 (9.2)
23	I regularly read a Hungarian newspaper (n=326)	1.52±0.88	228 (69.9)	44 (13.5)	38 (11.7)	16 (4.9)
24	I speak Hungarian at home (n=326)	1.45±0.89	247 (75.8)	32 (9.8)	26 (8.0)	21 (6.4)

25	I am familiar with important people in Hungarian history (n=326)	2.00±0.99	131 (40.2)	91 (27.9)	76 (23.3)	28 (8.6)
26	I think in Hungarian (n=326)	1.36±0.81	263 (80.7)	24 (7.4)	24 (7.4)	15 (4.6)
27	I speak Hungarian with my spouse or partner (n=326)	1.34±0.81	271 (83.1)	17 (5.2)	21 (6.4)	17 (5.2)
28	I like to eat Hungarian foods (n=326)	2.59±1.09	73 (22.4)	69 (21.2)	102 (31.3)	82 (25.2)

Items number 1 to 16 are the questions about ethnic society immersion (ESI)

Items number 17 to 28 are the questions about dominant society immersion (DSI)

I.

RESEARCH

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International medical students' acculturation and self-rated health status in Hungary: a cross-sectional study

Afriza Umami^{1,2*}, Edit Paulik¹ and Regina Molnár¹

Abstract

Background Over the past few decades, the number of international students has increased dramatically. These students have to adjust to unfamiliar social, cultural, and educational environments. The concept of acculturation has been applied in multiple studies on various health outcomes. This study investigated the relationship between acculturation and self-rated health (SRH) among international medical students.

Methods A cross-sectional study was conducted among international medical students at the University of Szeged, Hungary between April and October 2021. A total of 326 participants filled out questionnaires about sociodemographic characteristics, acculturation, and SRH. The modified Stephenson multigroup acculturation scale (SMAS) was used to assess the acculturation status; the scale defined acculturation as the degree of dominant society immersion (DSI, 12 items) and ethnic society immersion (ESI, 16 items). To measure SRH, participants were asked to rate their current general health and mental health. The data were analyzed by using descriptive statistics and the multiple logistic regression model.

Results 32.5% of the students reported having poor general and 49.7% poor mental health. We have found that acculturation was associated with SRH in multivariable logistic regression models controlling for sociodemographic characteristic. Bidimensional acculturation, such as ESI and DSI significantly influenced SRH as the likelihood of poor general health decreased (OR=0.50; 95% CI=0.31–0.81, P=0.005), when the ESI was higher, whereas the likelihood of poor mental health decreased (OR=0.52; 95% CI=0.35–0.79, P=0.002) if students had a greater DSI.

Conclusion Both types of immersion can affect the students' SRH. If the student could integrate better into their own ethnic group, their general health was better, and if they could strongly integrate into the Hungarian society, their mental health was more favorable. Acculturation measures should be promoted by academics and public health professionals in order to better understand their role in the behaviors, health outcomes, and health care use of medical international students. These findings will help professionals shape culturally sensitive prevention and counselling strategies for international student populations.

Keywords Acculturation, General health, International medical students, Mental health, Self-rated health

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Background

Studying abroad has become commonplace, and universities around the world welcome large numbers of international students [1]. There were 1.3 million students from abroad who were undertaking tertiary level studies across the European Union (EU) in 2018 [2]. As a member of the EU, Hungary is one of the educational destinations for international students at 11.4% [2]. Over 32 thousand international students were enrolled at Hungarian universities in the academic year of 2020/2021 [3]. About one-third of the foreign students go to one of the four Hungarian medical universities [4]. It is very popular with medical students due to the growing demand for migrant healthcare workers. Similarly, the limited share of medical schools in their home countries encourages students to continue their medical education abroad [5]. International medical students (IMSs) migrate abroad solely for the purpose of studying [6].

However, the decision to study abroad in Western countries may present several challenges to international students, including the acculturative stress and difficulties adjusting to the host country's environment [6], they live far from their family and have to find new friends, there are new types of foods to get accustomed to, and new learning and communication styles. They must accept the local customs and traditions, often experiencing cultural pressure or even culture shock, which is known as acculturation, a dynamic, complex, and multidimensional process of adaptation [7]. Acculturation is not the same for all international students. Students' degrees of acculturation towards other cultures vary depending on their different backgrounds and other factors, resulting in different preferences for which acculturation strategies to employ [8].

Many researchers see acculturation as a single continuum-changing process, moving from maintenance of the hometown culture on one side to immersion in the host culture on the other [9], generating the unidimensional model. However, for the past few decades, viewing acculturation as a unidirectional process has been critiqued as prohibiting migrants from acculturation to both the host as well as the origin culture simultaneously [10]. The new theoretical framework argues that the maintenance of the hometown culture and the adoption of the host culture must be seen as two independent dimensions [7, 8]. The new bidimensional model was proposed suggesting that the increase or decline of one culture does not affect the other. Most studies have used Berry's four-cell typology model (assimilation, separation, integration, and marginalization), which adhered to the bidimensional theory [11]. The different acculturations depend on the individual's desire to take part in the host culture as well as the cultural attitude of the receiving society [12].

The relationship between acculturation and health has attracted general attention [13, 14]; however, the framework theory of acculturation is still surrounded by controversy. Within the various theoretical frameworks, the relationship between acculturation and health has been studied for decades [15–17]. Acculturation has been proven to influence health through healthy behaviors, access to healthcare services, social support, self-esteem, and stress [12, 18, 19]. Most empirical studies using a unidimensional model have consistently found that non-dominant groups with low acculturation are more likely to have general health issues [20] and diabetes [21, 22]. However, studies have also revealed that the relationship between acculturation and health is not linear [20].

Since the outbreak of COVID-19 in December 2019 it has spread rapidly to almost all parts of the world [23], everyone is concerned about health issues, the economy, and the educational system [24]. A large number of students was having difficulty with their academic progress as a result of the closure of the campus and the switch to online learning [25]. According to the Student Covid Insights Survey (SCIS) performed by the Office for National Statistics (ONS) in 2020, over 50% of students in higher education in England experienced negative effects on their mental health and general well-being as a result of the COVID-19 pandemic [26]. According to the SCIS report, students expressed higher levels of anxiety and poorer levels of life satisfaction and happiness during the pandemic than the general population. Additionally, 18% of students had moderate-to-severe insomnia symptoms, and 12% reported moderate-to-severe symptoms of anxiety and depression [27]. These issues are exacerbated by multiple periods of self-isolation that many international students have experienced, which has ultimately been very challenging for their mental well-being [28, 29].

Although studies have assessed how acculturation status predicts the status of various health outcomes, it remains unclear whether acculturation status truly predicts one's SRH. In the current study, the population investigated is international medical students, and in this population, research related to acculturation and SRH has still rarely been conducted. In the present study, we measured SRH in two different health states: general health status and mental health status. Therefore, the aim of our study was to examine the association between acculturation and self-rated health among international medical students. Moreover, we hypothesized that the level of acculturation was associated with SRH status, and this relationship was confounded by sociodemographic characteristics and ethnic minority.

Methods

Study design and participants

In the cross-sectional study, international medical students from University of Szeged were invited to complete an online questionnaire using the online platform Survio (<https://www.survio.com/>). Data were collected from April to October 2021. We used convenience sampling; all international medical students from first to sixth years were invited to participate. The participation was voluntary and anonymous. Altogether 326 students filled out the questionnaire. The study protocol was approved by the Human Institutional and Regional Biomedical Research Ethics Committee, University of Szeged, Hungary (license number: 4936).

Variables and measurement

Dependent variable: self-reported Health (SRH) Status

SRH is one of the most frequently used measures in epidemiological, clinical, and social research [30]. In this study, SRH was measured from the point of general health and mental health reported by using a five-point Likert scale (“very bad=1”, “bad=2”, “moderate=3”, “good=4”, or “very good=5”). The respondents had to answer the question regarding general health, “how do you evaluate your general health status?” And for mental health they were asked, “how do you evaluate your mental health status?” For the purposes of data analyses, SRH was categorized as good (scales 4 and 5) and poor (scales from 1 to 3).

Independent variable: acculturation

To assess the acculturation status of international medical students in Hungary, we used the modified Stephenson multigroup acculturation scale (SMAS). The original SMAS is a 32-item questionnaire, initially developed for respondents from five different ethnic groups in America. The scale yields two dimensions: Ethnic society immersion (ESI) and dominant society immersion (DSI). Within both dimensions, there are four domains were assessed: language, interaction, media, and food, and each domain reflects knowledge, behaviors, and attitudes (e.g., language knowledge, language behavior, and language attitude) [31]. The answers included a Likert response format: 1=false, 2=partly false, 3=partly true, and 4=true. The ESI score reflects the level to which one retains values and practices of an ethnic group (home country), whereas the DSI score reflects the extent to which an individual adopts the practices of the dominant society (host country). This questionnaire was adapted by Asif (2018), in which he modified the original version by removing some questions related to the English language ability of respondents since being able to read, write, and speak English was one of the inclusion criteria [32]. Cronbach’s alpha in Asif’s study was 0.72 for DSI and

0.62 for ESI. In the current study, we used this modified 28-item questionnaire (ESI=16 items, DSI=12 items). The Cronbach’s alpha of the modified SMAS in our study was 0.82 for ESI and 0.88 for DSI (see Additional file 1). The summed mean scores for the subscales were used for statistical analysis, with a higher score reflected greater immersion on each dimension of either ESI or DSI. The items of the questionnaire are available in the Supplementary Information (see Additional file 2).

Covariates

Demographic characteristics: age was measured as a continuous variable (years); gender was categorized as “male” or “female”; relationship status was dichotomized as “not in relationship (single/divorced/living separated)” and “in relationship (married/common-law marriage/living together/having partner but not living together)”; and country of origin was classified according to the continent of the home country as “European” and “non-European” (Africa, America, Asia, and Middle East).

Years of study were categorized as “preclinical (1st /2nd)” and “clinical (3rd /4th /5th /6th)”. The economic condition of the students’ family was evaluated by a 5-point Likert scale, and it was dichotomized as “low income” (very bad/bad/average) and “high income (good/very good)”. Ethnic minority, whether students belong to an ethnic minority in their home country, had “no” or “yes” answers.

Statistical analysis

We used descriptive statistics to summarize the sample characteristics including frequency, percentage, mean, and standard deviation (SD). Univariable binary logistic regression was used to assess the unadjusted odd ratio between dependent and independent variables. The dependent variables were self-rated general health and self-rated mental health. Multivariable logistic regression analyses were performed to examine the relationship between acculturation and self-rated health by adjusting for covariates. The independent variable involved in the regression analysis was acculturation: ESI and DSI, while covariates were student age, gender, year of study, country of origin, relationship status, economic status, and ethnic minority. Student age, ESI, and DSI were considered as continuous variables in the model. The Hosmer–Lemeshow test was used to determine the goodness of fit of the logistic regression model. Odds ratio (OR) and 95% confidence interval (CI) were used to indicate the association between acculturation and independent variables. Statistical significance was defined at $p < 0.05$.

Data analysis was carried out with IBM SPSS (Statistical Package for the Social Sciences) version 27 (SPSS Inc., Chicago, IL, USA).

Table 1 Characteristics of respondents (N = 326)

Characteristic	Category	Mean ± SD	N	(%)
Age (year)		22.86 ± 2.86		
Gender	Male		151	46.3
	Female		175	53.7
Year of study	Preclinical		224	68.7
	Clinical		102	31.3
Country of origin	Non-European		198	60.7
	European		128	39.3
Relationship status	Not in a relationship		224	74.8
	In a relationship		82	25.2
Economic status	Low income		86	26.4
	High income		240	73.6
Ethnic minority	No		278	85.3
	Yes		48	14.7
Self-rated general health	Good		220	67.5
	Poor		106	32.5
Self-rated mental health	Good		164	50.3
	Poor		162	49.7
Acculturation	ESI	3.19 ± 0.47		
	DSI	2.05 ± 0.57		

ESI = Ethnic Society Immersion; DSI = Dominant Society Immersion; SD = standard deviations

Results

Descriptive characteristics of the participants are presented in Table 1. The average age was 22.86 ± 2.86 years. 53.7% of the students were male, and more than half were

in the preclinical years of medical school. More participants reported higher economic family income and no ethnic minority status. The majority of students were from non-European countries (34.7% of the participants were from the Middle East, 19.0% were Asians, 5.2% were Americans, and 1.8% were Africans). More than half of medical international students reported good general health status (67.5%), while half of them reported good mental health status (50.3%).

The current study measured acculturation along two dimensions: the ESI score is 3.19 ± 0.47 , which reflects the extent to which an individual retains the values and practices of an ethnic group (home country), and the DSI score is 2.05 ± 0.57 , which reflects the extent to which an individual adopts the practices of the dominant society (host country). Most international students still prefer to speak in their native language and read and write in their native language in the ESI dimension. While on the DSI dimension, most students felt at home in Hungary, got information about current affairs in Hungary, and felt accepted by Hungarians. However, their understanding of the Hungarian language was inadequate. The distribution of the answers is available in Supplementary Information (see Additional file 2).

The descriptive analyses of general health and mental health are presented in Table 2.

Table 2 Cross tabulations of self-rated general health and self-rated mental health

Variables	General health				Mental health			
	Good (220)		Poor (106)		Good (164)		Poor (162)	
	n	%	n	%	n	%	n	%
ESI (mean ± SD)	(3.25 ± 0.42)		(3.09 ± 0.56)		(3.26 ± 0.39)		(3.13 ± 0.53)	
DSI (mean ± SD)	(2.10 ± 0.55)		(1.95 ± 0.58)		(2.15 ± 0.58)		(1.95 ± 0.53)	
Age (mean ± SD)	(22.71 ± 2.88)		(23.16 ± 2.79)		(23.02 ± 3.04)		(22.69 ± 2.65)	
Gender								
Male	108	33.1	43	13.2	79	24.2	72	22.1
Female	112	34.4	63	19.3	85	26.1	90	27.6
Year of study								
Preclinical	156	47.9	68	20.9	112	34.4	112	34.4
Clinical	64	19.6	38	11.7	52	16.0	50	15.3
Country of origin								
Non-European	127	39.0	71	21.8	96	29.4	102	31.3
European	93	28.5	35	10.7	68	20.9	60	18.4
Relationship status								
Not in a relationship	165	50.6	79	24.2	125	38.3	119	36.5
In relationship	55	16.9	27	8.3	39	12.0	43	13.2
Economic status								
Low income	53	16.3	33	10.1	40	12.3	46	14.1
High income	167	51.2	73	22.4	124	38.0	116	35.6
Ethnic minority								
No	190	58.3	88	27.0	147	45.1	131	40.2
Yes	30	9.2	18	5.5	17	5.2	31	9.5

ESI = Ethnic Society Immersion; DSI = Dominant Society Immersion; SD = standard deviations

Table 3 Univariable and multivariable logistic regression analysis of sociodemographic, acculturation and self-rated general health (poor general health)

Variables	Poor general health							
	UAOR	95% CI		P-value	AOR	95% CI		P-value
		Lower	Upper			Lower	Upper	
ESI (mean ± SD)	0.50	0.31	0.81	0.005	0.51	0.30	0.87	0.014
DSI (mean ± SD)	0.60	0.39	0.94	0.024	0.69	0.43	1.11	0.124
Age (mean ± SD)	1.06	0.98	1.14	0.183	1.08	0.99	1.18	0.103
Gender								
Male	Ref	0.89	2.26	0.148	Ref	0.87	2.34	0.155
Female	1.41				1.43			
Year of study								
Preclinical	Ref	0.83	2.23	0.218	Ref	0.52	1.70	0.849
Clinical	1.36				0.94			
Country of origin								
Non-European	Ref	0.41	1.09	0.109	Ref	0.45	1.40	0.428
European	0.67				0.79			
Relationship status								
Not in a relationship	Ref	0.60	1.75	0.927	Ref	0.65	2.08	0.617
In relationship	1.03				1.16			
Economic status								
Low income	Ref	0.42	1.17	0.177	Ref	0.46	1.37	0.411
High income	0.70				0.79			
Ethnic minority								
No	Ref	0.69	2.45	0.425	Ref	0.55	2.12	0.824
Yes	1.29				1.08			

UAOR: unadjusted odds ratio; AOR: adjusted odds ratio; 95% CI: 95% confidence interval

In case of adjusted model: Hosmer–Lemeshow goodness of fit test $\chi^2=7.067$, $df=8$, $p=0.529$

Table 3 shows the univariable and multivariable logistic regression analyses of self-rated general health. According to the univariable regression analysis, ESI and DSI were significantly associated with general health status. For every unit increase in ESI, the odds of poor general health decreased by 50% (Unadjusted Odds Ratio (UAOR)=0.50; 95% CI=0.31–0.81, $P=0.005$) and each 1-unit increase in DSI reduced the odds of poor general health (UAOR=0.60; 95% CI=0.39–0.94, $P=0.024$). According to the multivariable logistic regression model, ESI negatively influenced the poor general health of international medical students after adjusting for all covariates. The adjusted odds ratio (AOR) for ESI was 0.51 (95% CI=0.30–0.87; $P=0.014$), indicating that holding all other variables constant in the model, with every unit increase in ESI, the students were 0.51 times less likely to have poor general health.

Table 4 demonstrates the univariable and multivariable logistic regression analyses of self-rated mental health. The unadjusted results revealed that ESI and DSI were associated with lower poor mental health, while students who had been exposed to ethnic minorities were more likely to have poor mental health than those who have no experienced ethnic minorities (UAOR=2.05; 95% CI=1.08–3.87, $P=0.025$). According to the results of multiple logistic regression models of mental health,

DSI negatively influenced poor mental health of international medical students after adjusting for all covariates (Table 4). The odds ratio for DSI was 0.52 (AOR=0.52; 95% CI=0.52–0.33; $P=0.004$), indicating that holding all other variables constant in the model, with every unit increase in DSI, the students were 0.52 times less likely to have poor mental health.

Discussion

The aim of this study was to better understand the relationship between acculturation and SRH among international medical students. Specifically, we investigated whether acculturation was related to general and mental health, after controlling for all covariates.

According to the findings of this study, 32.5% of international medical students reported to have poor general health. Meanwhile, nearly half of the students reported to have poor mental health. These research results are consistent with the findings of Ochnik et al. (2021), who have found that the prevalence of mental health problems in university students is high, with the prevalence of high stress, depression, and generalized anxiety symptoms in the total sample being 61.30%, 40.3%, and 30%, respectively [33]. Furthermore, international students reported higher rates of depression, suicidal ideation, anxiety, post-traumatic stress disorder (PTSD), academic

Table 4 Univariable and multivariable logistic regression analysis of sociodemographic, acculturation and self-rated mental health (poor mental health)

Variables	Poor mental health			P	AOR	95% CI		P
	UAOR	95% CI Lower	Upper			Lower	Upper	
ESI (mean ± SD)	0.53	0.33	0.87	0.012	0.64	0.38	1.08	0.100
DSI (mean ± SD)	0.52	0.34	0.78	0.002	0.52	0.34	0.82	0.004
Age (mean ± SD)	0.96	0.89	1.04	0.302	0.98	0.89	1.07	0.615
Gender								
Male	Ref	0.75	1.80	0.500	Ref	0.68	1.71	0.743
Female	1.16				1.08			
Year of study								
Preclinical	Ref	0.60	1.54	0.870	Ref	0.46	1.43	0.474
Clinical	0.96				0.81			
Country of origin								
Non-Europe	Ref	0.53	1.30	0.413	Ref	0.59	1.68	0.978
Europe	0.83				0.99			
Relationship status								
Not in a relationship	Ref	0.70	1.91	0.565	Ref	0.85	2.57	0.168
In relationship	1.16				1.48			
Economic status								
Low income	Ref	0.50	1.33	0.412	Ref	0.47	1.36	0.407
High income	0.81				0.79			
Ethnic minority								
No	Ref	1.08	3.87	0.025	Ref	0.99	3.87	0.051
Yes	2.05				1.97			

UAOR: unadjusted odds ratio; AOR: adjusted odds ratio; 95% CI: 95% confidence interval

In case of adjusted model: Hosmer–Lemeshow goodness of fit test $\chi^2=7.038$, $df=8$, $p=0.533$

stress, and loneliness [34]. Several studies show that tertiary education students have a higher incidence of mental health problems than the general population, and that international students have higher levels of anxiety than domestic students [35].

Our current research divided acculturation into two dimensions: on the one hand, dominant society immersion, in which students can meet and interact with the host country's society, culture, beliefs, and attitudes, and on the other hand, ethnic society immersion, in which students can maintain cultural values and heritage from their home country.

Our findings suggest that high ethnic society immersion, in which students retain their ethnic group's values and practices (home country), tends to decrease the poor general health status. This is consistent with the findings of Suleiman et al. (2021), who have discovered that greater heritage identity is associated with a lower risk of poor self-rated health [36]. Meanwhile, research conducted among Asian immigrant groups has found that the separated are significantly more likely than the assimilated to report poor-to-fair SRH [37].

In addition, we discovered that dominant society immersion had no significant relationship with self-rated general health. Meanwhile, Wang's study describes that acculturation is associated with a higher likelihood

of reporting excellent or good health among older Chinese Americans [27]. Other studies have argued that acculturation was a risk factor for SRH [38, 39]; a study conducted by Johnson et al. (2010) has used Andersen's socio-behavioral approach, which allows for a better understanding of how acculturation affects health status by systematically evaluating a group of determinants and their impact on SRH, and the findings have pointed at that Mexican-oriented acculturation remains an independent predictor of fair/poor health [38].

The current study found that high levels of dominant society immersion was associated with a lower risk of poor mental health. The majority of international students felt accepted by Hungarians and received information about current events in Hungary. This might reduce students' feelings of loneliness in a new environment.

The results of our study seem to be consistent with the findings of a systematic review, which has discussed that marginalization had the most negative effects on the mental health of migrant populations, while integration had the most positive effects. The study also identifies three major sources of acculturation stress and poor mental health, such as a lack of education or skill set, a lack of proficiency in the host country's language, and financial difficulties [13].

According to some theories, acculturation can help with everyday social interactions [40, 41]. Nonetheless, acculturation can increase stress or conflict between two competing cultures [42] or be associated with decreased social support [43]. Not surprisingly, empirical findings have been mixed, with some studies linking higher acculturation to a new culture to poorer SRH [38, 39], while others show favorable relationship to mental health [37, 44] or no relationship at all [36].

Limitations of the study

Several limitations of the current study need to be considered while interpreting the results. The data obtained were based on self-report, which can lead to response bias. Second, the data are cross-sectional in nature, thus preventing the authors from drawing causal conclusions. Self-rated health possibly influences acculturation. Whereas the general health status and low mental health will affect the acculturation process in international students. Third, this study used a non-probability sampling; thus, the sample might not be representative. Fourth, while self-rated health is an informative measure of older adults' general health status, future studies are encouraged to use objective health measures to enhance rigor. Therefore, future studies should include these indicators in measuring acculturation. Finally, we did not measure acculturation stress in this study, which is an important factor in poor health outcomes and the health effects of COVID-19 pandemic should be considered to the results of the survey.

Conclusion

This study highlights the relationship between acculturation and self-health assessment by controlling for confounding variables, such as demographics, socioeconomic status and ethnic minorities. Measurement of acculturation uses two dimensions, namely ethnic society and dominant society, which provide a two-way explanation of the concept of acculturation. The likelihood of poor general health decreased when the ESI was high, whereas the DSI had no significance for poor general health. Poor mental health will decrease if students have a greater DSI, while ESI is not associated with the incidence of poor mental health among international students. However, the results also demonstrated that sociodemographic and ethnic minority were unrelated to students' general health status, while ethnic minority had an influence on their mental health status but not sociodemographic characteristics.

Understanding the relationship of acculturation on the general and mental health status of these special populations is important. Using the international student population to understand the impact of acculturation on health is still a rarity in research; therefore, these

results can be used to provide information on improving the health of international students during their university studies. Our findings are intended to inspire future research about the potential psychosocial determinants of self-rated health among international students. Providing culturally sensitive services and finding ways to strengthen and develop social support for international students while facilitating their integration will benefit their general and mental health.

Abbreviations

DSI	Dominant society immersion.
ESI	Ethnic society immersion.
EU	European Union.
IMSS	International medical students.
PTSD	Post-traumatic stress disorder.
SMAS	Stephenson multigroup acculturation scale.
SRH	Self-rated health.
SCIS	Student Covid Insights Survey.
ONS	Office for National Statistics.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-022-14334-y>.

Supplementary Material 1

Supplementary Material 2

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Authors' contributions

AU: formal analysis, writing original draft, interpretation and revise, editing. EP: conceptualization, methodology, interpretation, and revise, editing and supervision. RM: investigation, conceptualization, interpretation, and revise, editing and supervision. All authors have read and approved the final manuscript.

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Data availability

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

Declarations

Ethics approval and consent to participate

All methods were performed in accordance with the relevant guidelines and regulations and adheres to the Declaration of Helsinki. Ethical approval was provided by the Human Institutional and Regional Biomedical Research Ethics Committee, University of Szeged, Hungary (license number: 4936). Informed consent was obtained from all included respondents.

Consent for publication

Not applicable.

Competing interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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II.

RESEARCH

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Healthcare-seeking of medical students: the effect of socio-demographic factors, health behaviour and health status – a cross-sectional study in Hungary

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Abstract

Background Medical students are more likely to have various physical and psychological issues, but less information is available about the healthcare-seeking behaviour for physical and mental health issues. The aim of this study is to determine the factors affecting medical students' healthcare-seeking when visiting a general practitioner (GP) and/or psychologist.

Methods 688 medical students (326 International and 362 Hungarian,) participated in a cross-sectional study. The information was gathered using a self-administered online questionnaire and covered socio-demographic background, health behaviour, general and mental health status and healthcare-seeking. For analysing adjusted associations, multivariable logistic regression models were used.

Results Overall, 56.8% of medical students visit the GP; and 17.2%, the psychologist. Hungarian medical students visited the GP with chronic diseases, International medical students were more likely to visit a GP when they encountered sexual activity and had chronic diseases. Moreover, there was a significant correlation between sex, alcohol consumption, and perceived stress in the total sample of psychologist visits. When Hungarian medical students were in their clinical years and had a poor self-rated mental health, they were more likely to visit a psychologist. Whereas female international medical students and those who had poor self-rated mental health were more likely to seek psychological help.

Conclusion Students visit a GP and/or psychologist is associated with a variety of factors, including socio-demographic background, health behaviours, and health issues. Medical schools should encourage help-seeking behaviours and early disclosure of medical students. Their ability to grasp healthcare attitudes and designing treatments will be important for both their academic success and future profession.

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Keywords Healthcare-seeking, Medical students, General practitioner, Psychologist

Background

The absence of seeking out physical or mental health care among medical students is acknowledged as an increasing prevalent issue by the literature [1, 2]. Medical students are reluctant to seek out treatment, instead, they show preference to seek help from informal sources, such as friends and family [3]. Informal medical care from colleagues is an element of the culture of doctors and may be an example of what future doctors learn from their role models [3, 4]. A high prevalence of mental health illnesses, lack of or delay in obtaining health care, self-diagnosis, self-prescribing and dangerous behaviours have all been observed among qualified doctors [5]. Medical students retrieve attitudes and values from professional role models, and they could also adopt behavioural traits that encourage them to get informal care for physical and mental health issues [4].

In a survey conducted at a British medical school, it has been discovered that 43% of the students had unofficially contacted a doctor who was a friend or family member, 9.2% had initiated their own investigations, and 25% had been examined by a colleague [6]. Additionally, 90% of the respondents in North American questionnaire-based research conducted in nine medical schools have reported a need for medical attention while in training. Two-thirds of them has received informal care from colleagues and half requested that a fellow student do a physical examination [7]. College students in China were found to be more reliant on seeking out online health information (OHI), just 32.4% followed up with doctors, and around 20% experienced internet hacking/fraud which will have a negative impact on their health in the future [8]. The study found that Chinese students rely on OHI to manage both their own and others' health without sufficient knowledge/skills to identify misinformation [8].

The prevalence of mental distress among medical students ranged between 12.2 and 96.7% according to a systematic review that was conducted on 16 studies that were identified outside of North America in the English-speaking world [9]. According to a study conducted in Hungary [10], Hungarian students reported less mental well-being than students from the Mediterranean region, Israel, and Scandinavia. Furthermore, it was discovered that 49.7% of foreign students in Hungary who self-reported their mental health had poor mental health [11]. Meanwhile, the chronic disease burden is increasing globally. The study reported that 41.5% of medical students in Morocco confirmed having a chronic disease, among which 80% were under treatment [12]. Furthermore, research conducted among residents of various

specialties in Saudi Arabia reported that chronic disease was reported by 29.1% [13].

Researchers should be aware of the physical and mental health issues for which students are likely to require assistance when analysing their behaviour of seeking health care [4]. Medical students seem to be more distressed than the population in general and more anxious than non-students of same ages [2, 14]. Studying as well as having concerns about competency and achievement leads to the development of stress among medical students [15]. Nonetheless, there is little information available on the physical health of medical students, their behaviour when seeking assistance for physical and mental health issues, and how it is related to the accessibility of issues or other barriers to receiving different types of care [4]. Although the prevalence of physical illness among medical students remains uncertain, there is some evidence to suggest that they will have significant health concerns during their training [16].

The literature consistently recognized the high prevalence of mental distress among medical students [9, 17–19] but physical health of medical students is less understood [4, 20] however, one longitudinal study has found that the physical health can decline during medical school years [21]. Medical students often refrain from disclosing and seeking help [20–22], which could potentially endanger both themselves and their patients. There is a scarcity of literature on the factors influencing their choices regarding seeking help or disclosing health conditions [20]. Other studies tend to look at the role of the medical school in monitoring and improving student welfare that is mainly related to mental distress [23] and the importance of stress management programmes [24], rather than the role of general practitioners (GPs) in the support and management of physical and mental health. Hence, this study focusing to investigate the visiting the GP and/or the psychologist and the associated factors among medical students. Moreover, medical students experience a higher incidence of health issues compared to students in other fields [2, 14]. This can be attributed to the significant risk factor associated with pursuing education at a medical university and subsequently working as a doctor [4]. It is widely recognized that doctors often face challenges related to their mental and physical well-being. Hence, it is crucial to examine their health-seeking behaviour, as improving this aspect will be vital for their future healthcare needs.

Table 1 Characteristics of respondents by Hungarian and international medical students

Characteristics	Total (688)		Hungarian (362)		International (326)		P
	N	%	N	%	N	(%)	
<i>Socio-demographic factors</i>							
Age (years)							
18–25	596	86.6	326	90.1	270	82.8	0.005
26–37	92	13.4	36	9.9	56	17.2	
Sex							
Male	268	39.0	117	32.3	151	46.3	<0.001
Female	420	61.0	245	67.7	175	53.7	
Years of study							
Preclinical	415	60.3	191	52.8	224	68.7	<0.001
Clinical	273	39.7	171	47.2	102	31.3	
Relationship status							
Not in a relationship	425	61.8	181	50.0	244	74.8	<0.001
In a relationship	263	38.2	181	50.0	82	25.2	
Economic status							
Low income	247	35.9	161	44.5	86	26.4	<0.001
High income	441	64.1	201	55.5	240	73.6	
<i>Health behaviours</i>							
Smoking							
No	533	77.5	285	78.7	248	76.1	0.405
Yes	155	22.5	77	21.3	78	23.9	
Alcohol consumption							
No	206	29.9	80	22.1	126	38.7	<0.001
Yes	482	70.1	282	77.9	200	61.3	
Sexual intercourse							
No	324	47.1	151	41.7	173	53.1	0.003
Yes	364	52.9	211	58.3	153	46.9	
<i>General health status</i>							
Chronic disease							
No	573	83.6	294	81.2	281	86.2	0.078
Yes	113	16.4	68	18.8	45	13.8	
BMI							
≤ 24.9 kg/m ²	155	22.5	58	16.0	97	29.8	<0.001
≥ 25.0 kg/m ²	533	77.5	304	84.0	229	70.2	
Self-rated general health							
Good	460	66.9	240	66.3	220	67.5	0.741
Poor	228	33.1	122	33.7	106	32.5	
<i>Mental health status</i>							
Perceived stress scale (PSS)							
Lower	545	79.2	276	76.2	269	82.5	0.043
Higher	143	20.8	86	23.8	57	17.5	
Self-rated mental health							
Good	338	49.1	174	48.1	164	50.3	0.557
Poor	350	50.9	188	51.9	162	49.7	
<i>Healthcare-seeking</i>							
Visiting a GP							
No	297	43.2	153	42.3	144	44.2	0.614
Yes	391	56.8	209	57.7	182	55.8	
Visiting a psychologist							
No	570	82.8	290	80.1	280	85.9	0.045
Yes	118	17.2	72	19.9	46	14.1	

Methods

Study design and participants

A cross-sectional study was employed among medical students at the University of Szeged (USZ), Hungary.

The study was carried out between April and October 2021. The medical students from the first to sixth years were invited to participate in the online survey using convenience sampling. The survey was completed by 688 students in total (n=362 Hungarian and n=326 international students). The participation was voluntary and anonymous.

The total number of medical students enrolled at the University of Szeged was 2,382 students (Hungarian students 1,233 and international students 1,145) in the 2020/2021/2 academic year. The sample size was taken by calculating the 95% confidence level, a margin of error (ϵ) of 5%, and 50% population proportion.

Medical treatment of the students at the University of Szeged

The medical services available to medical students are easily accessible and located in the city centre. There are general practitioners in primary care, where services are provided only through appointments with a GP through the modulo platform. Secondary care of all students (regardless of the type of insurance) is provided at the clinics of the Albert Szent-Györgyi Clinical Center. In each case students need to contact the institutions' own reception desk first. If students need emergency assistance, they can come to emergency care or call the ambulance service.

In addition, there is a student counselling centre as well as a local psychologist. Medical and counselling services

Table 2 Univariable logistic regression analysis of visiting a GP. OR=odds ratio, CI=confidence interval, BMI=body mass index

Characteristics	Total (688)			Hungarian (362)			International (326)		
	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
<i>Socio-demographic factors</i>									
Age (years)									
18–25			1			1			1
26–37	1.50	0.95–2.37	0.081	1.75	0.83–3.68	0.134	1.39	0.77–2.52	0.269
Sex									
Male			1			1			1
Female	1.14	0.83–1.55	0.402	1.03	0.66–1.60	0.900	1.24	0.80–1.92	0.336
Years of study									
Preclinical			1			1			1
Clinical	1.15	0.85–1.57	0.357	1.01	0.66–1.53	0.954	1.34	0.83–2.16	0.224
Relationship status									
Not in a relationship			1			1			1
In a relationship	1.17	0.86–1.61	0.301	1.02	0.67–1.55	0.915	1.42	0.85–2.37	0.180
Economic status									
Low income			1			1			1
High income	0.91	0.66–1.25	0.561	0.79	0.52–1.20	0.280	1.13	0.69–1.86	0.611
<i>Health behaviours</i>									
Smoking									
No			1			1			1
Yes	0.99	0.69–1.43	0.987	0.97	0.58–1.61	0.906	1.03	0.62–1.72	0.906
Alcohol consumption									
No			1			1			1
Yes	1.48	1.07–2.06	0.018	1.15	0.70–1.90	0.575	1.81	1.16–2.85	0.010
Sexual intercourse									
No			1			1			1
Yes	1.50	1.11–2.04	0.008	1.06	0.69–1.61	0.799	2.21	1.41–3.45	0.001
<i>General health status</i>									
Chronic illness									
No			1			1			1
Yes	3.79	2.31–6.21	<0.001	3.85	2.02–7.34	<0.001	3.70	1.72–7.96	0.001
BMI									
≤ 24.9 kg/m ²			1			1			1
≥ 25.0 kg/m ²	0.69	0.47–0.99	0.045	0.56	0.31–1.03	0.061	0.75	0.46–1.21	0.248
Self-rated general health									
Good			1			1			1
Poor	1.18	0.86–1.64	0.293	1.13	0.73–1.77	0.564	1.24	0.77–1.98	0.363

are available in Hungarian, English and also German, however staff available for English and German are limited. Hungarian and international (who receive scholarships from the Hungarian government) students have health insurance (social security number, SSN). If students do not have SSN they can use private insurance such as Generali stadium health insurance, which must be paid by the student. As long as students have health insurance, the psychological services they receive are also free.

Data collection and measurements

Online questionnaires were used to collect data. Students were requested to complete the questionnaire by clicking on the link given on the teaching platform before or after the teachers delivered the lecture or practice. The questionnaire took about 10–15 min to complete. The questionnaires were available in both English and Hungarian, and participants were required to fill in the informed consent before starting the online survey. Only fully completed questionnaires were taken into account. In our online questionnaire, respondents were required to answer all questions, as it was designed to prevent the submission of incomplete responses. This approach ensured that participants could only proceed with the survey after providing answers for all the questions.

Socio-demographic characteristics

Age: Students were asked to provide their age in years. For data analysis, age was divided into two categories: 18–25 and 26–37 years. Sex: Students were given the choice of choosing either a male or female sex on the

questionnaire. Years of study: the years of study were categorized into ‘preclinical (1st/2nd)’ and ‘clinical (3rd/4th/5th/6th)’. Relationship status was dichotomized as ‘not in relationship (single/divorced/living separated)’ and ‘in relationship (married/common-law marriage/living together/ having a partner but not living together)’. The financial situation of the students’ family was evaluated by a 5-point Likert scale, which was dichotomized as ‘poor income’ (very bad/bad/average) and ‘high income (good/very good)’.

Health behaviours

Smoking and alcohol consumption: if they smoked or drank alcohol, the response options were Yes (yes, occasionally/yes, regularly) or No. Sexual intercourse: if the students ever had sexual activity during medical school, and the response options were Yes or No.

Health status

Chronic diseases: if medical students ever experienced any chronic illness during their study period, either self-determined or diagnosed by a doctor; response option was Yes or No. Body mass index (BMI), there were two categories, underweight and normal: BMI ≤ 24.9 kg/m² and overweight and obese: BMI ≥ 25.0 kg/m². Self-rated general health and mental health reported by using a five-point Likert scale (1=very bad, 5=very good). The respondents had to answer the question regarding general health, “how do you evaluate your general health status?” and for mental health they were asked, “how do you evaluate your mental health status?”. For the purposes of

Table 3 Multivariable logistic regression analysis of visiting a GP

Characteristics	Total (688)			Hungarian (362)			International (326)		
	AOR	95% CI	p value	AOR	95% CI	p value	AOR	95% CI	p value
<i>Health behaviours</i>									
Alcohol consumption									
No	1			1			1		
Yes	1.26	0.89–1.79	0.191	1.07	0.63–1.80	0.804	1.37	0.84–2.23	0.204
Sexual intercourse									
No	1			1			1		
Yes	1.35	0.98–1.87	0.067	1.04	0.67–1.63	0.848	1.86	1.14–3.01	0.012
<i>General health status</i>									
Chronic illness									
No	1			1			1		
Yes	3.50	2.13–5.76	<0.001	3.70	1.93–7.09	<0.001	3.22	1.46–7.07	0.004
BMI									
≤ 24.9 kg/m ²	1			1			1		
≥ 25.0 kg/m ²	0.78	0.53–1.14	0.190	0.62	0.33–1.15	0.128	0.95	0.57–1.58	0.831
Nagelkerke R ²									
		0.080			0.081			0.098	
Hosmer and Lemeshow Test									
		P=0.577			P=0.768			P=0.257	

AOR=adjusted odds ratio, CI=confidence interval, BMI=body mass index

Adjusting for socio-demographic factors (age, sex, years of study, relationship status, economic status)

data analyses, self-rated health (SRH) was categorized as good (scores 4 and 5) and poor (scores 1 to 3).

Perceived stress scale (PSS): The 10-item Perceived Stress Scale (PSS-10) [25] is a 10-item questionnaire originally developed by Cohen et al. (1983). Respondents were asked how often they felt a certain way on a five-point scale from 'never' to 'very often'. PSS is not a diagnostic instrument, and the developer has not published any score cut-offs [26]. In the current study, for the purposes of data analysis, PSS was categorized as lower stress (score < 14) and higher stress (score ≥ 14) categories refer to previous study [27].

Healthcare-seeking

Healthcare-seeking behaviour is defined as any activity performed by those who assumed they had a health issue or became ill with the intention of discovering an

appropriate treatment [28]. Researchers determined that visits to the GP and psychologist are forms of healthcare-seeking behaviours. Visiting a GP or a psychologist: students answered the question if they visited the family doctor in the previous year, if they visited a psychologist in the previous year, and the response options were Yes and No.

Statistical analysis

Data were analysed by IBM SPSS 'Statistics 28.0'. Socio-demographic characteristics, health behaviours, health status and healthcare seeking were analysed using chi-square test. Univariable logistic regression analysis of these variables was performed to evaluate unadjusted relationships, only variables that have a p value < 0.05 were carried out by multivariable analysis. Multivariable logistic regression models were constructed to evaluate

Table 4 Univariable logistic regression analysis of visiting a psychologist

Characteristics	Total (688)			Hungarian (362)			International (326)		
	OR	95% CI	p value	OR	95% CI	p value	OR	95% CI	p value
<i>Socio-demographic factors</i>									
<i>Age (years)</i>									
18–25	1			1			1		
26–37	1.30	0.75–2.26	0.339	1.39	0.62–1.11	0.418	1.41	0.65–3.04	0.376
<i>Sex</i>									
Male	1			1			1		
Female	2.10	1.35–3.29	0.001	1.87	1.02–3.43	0.043	2.19	1.12–4.28	0.022
<i>Years of study</i>									
Preclinical	1			1			1		
Clinical	1.46	0.98–2.19	0.058	2.02	1.19–3.42	0.009	0.74	0.36–1.50	0.412
<i>Relationship status</i>									
Not in a relationship	1			1			1		
In a relationship	1.23	0.82–1.84	0.309	1.15	0.68–1.92	0.598	1.05	0.52–2.15	0.875
<i>Economic status</i>									
Low income	1			1			1		
High income	0.93	0.61–1.40	0.730	1.07	0.63–1.80	0.787	0.89	0.44–1.79	0.755
<i>Health behaviours</i>									
<i>Smoking</i>									
No	1			1			1		
Yes	1.02	0.63–1.64	0.920	1.19	0.64–2.19	0.588	0.86	0.41–1.84	0.708
<i>Alcohol consumption</i>									
No	1			1			1		
Yes	1.73	1.08–2.79	0.024	1.97	0.96–4.05	0.061	1.35	0.70–2.63	0.364
<i>Sexual intercourse</i>									
No	1			1			1		
Yes	1.06	0.71–1.58	0.750	0.93	0.55–1.57	0.796	1.15	0.61–2.15	0.653
<i>Mental health status</i>									
<i>PSS</i>									
Lower	1			1			1		
Higher	2.21	1.43–3.43	< 0.001	2.17	1.24–3.79	0.007	2.11	1.03–4.33	0.041
<i>Self-rated mental health</i>									
Good	1			1			1		
Poor	3.12	2.01–4.83	< 0.001	2.94	1.67–5.18	< 0.001	3.37	1.68–6.77	0.001

OR=odds ratio, CI=confidence interval, BMI=body mass index

adjusted relationships, the adjusted variables were socio-demographic factors (age, sex, years of study, relationship status, and economic status). All analyses were carried out as a comparison of the Hungarian and international students. In the logistic regression analysis Nagelkerke R^2 values were used to evaluate the explanatory power of the models, whereas Hosmer and Lemeshow proposed a goodness-of-fit test.

Ethics

The study protocol was reviewed and approved by the Human Institutional and Regional Biomedical Research Ethics Committee, University of Szeged, Hungary (license number: 4936). All participants were informed of the objectives and procedures of the study and their rights to withdraw from the study. Informed consent was obtained from all included participants. Anonymous data were collected and held securely.

Results

Characteristics of the sample

The characteristics of the respondents are described in Table 1. The majority (86.6%) of the students were aged 18–25 years with the mean age of 22.47 ± 2.75 years. There were significant differences between the Hungarian and the international medical students in socio-demographic factors, such as age, sex, year of study, relationship and economic status.

There was no significant difference in smoking behaviour between Hungarian (21.3%) and international students (23.9%) ($p=0.405$), while alcohol consumption and sexual activity differed significantly between the two groups, $p<0.001$ and $p=0.003$, respectively. Hungarian (alcohol 77.9%; sexual intercourse 58.3%); International (alcohol 61.3%; sexual intercourse 46.9%).

There was no significant difference in self-rated health and chronic illnesses between the two groups. Meanwhile, more than a quarter (70.2%) of the international students reported having a $BMI \geq 25.0 \text{ kg/m}^2$, whereas 84.0% of the Hungarian students had a $BMI \geq 25.0 \text{ kg/m}^2$ (a statistically significant difference; $p<0.001$).

In the total sample, there was a difference in the proportion of visits to the GP (56.8%) and the psychologist (17.2%); the number of visits to the psychologist was lower. Concerning the number of visits to the GP between Hungarian (57.7%) and international (55.8%) students, there was no significant difference. On the other hand, there was a statistically significant difference between the two groups regarding visits to the psychologist: Hungarian (19.9%) and international (14.1%) ($p=0.045$). This difference could potentially be attributed to the availability of psychological services, which might vary between the groups and influence the utilization of such services.

Table 5 Multivariable logistic regression analysis of visiting psychologist

Characteristics	Total (688)			Hungarian (362)			International (326)		
	AOR	95% CI	p value	AOR	95% CI	p value	AOR	95% CI	p value
<i>Socio-demographic factors</i>									
Sex									
Male	1			1			1		
Female	1.98	1.25–3.13	0.004	1.78	0.95–3.35	0.072	2.21	1.11–4.41	0.024
Years of study									
Preclinical	1			1			1		
Clinical	1.29	0.85–1.95	0.228	1.74	1.00–3.01	0.048	0.70	0.34–1.47	0.352
<i>Health behaviours</i>									
Alcohol consumption									
No	1			1			1		
Yes	1.71	1.05–2.79	0.032	2.01	0.96–4.23	0.064	1.33	0.67–2.64	0.415
<i>Mental health status</i>									
PSS									
Lower	1			1			1		
Higher	2.70	1.68–4.33	<0.001	1.28	0.68–2.41	0.440	1.28	0.59–2.76	0.530
Self-rated mental health									
Good	1			1			1		
Poor	1.30	0.80–2.11	0.284	2.45	1.31–4.60	0.005	3.08	1.47–6.45	0.003
Nagelkerke R^2									
		0.109			0.118			0.108	
Hosmer and Lemeshow Test									
		0.644			0.102			0.800	

AOR=adjusted odds ratio, CI=confidence interval, BMI=body mass index

Adjusting for socio-demographic factors (age, sex, years of study, relationship status, economic status)

Medical students visit to the GP

In the univariable logistic regression (Table 2), there was no significant relationship identified between the socio-demographic characteristics and the GP visits by medical students in both groups.

Health behaviours significantly associated with visiting the GP were found to be alcohol consumption and sexual intercourse in the total sample. While smoking behaviour had no significant relationship in either group. General health status significantly associated with the GP visits included the presence of a chronic disease as well as BMI scale in the total sample. In contrast, self-rated general health had no significant association in either group.

International students were more likely to visit GP when they had chronic illness and experienced health behaviour (such as alcohol and sexual intercourse). Hungarian students were more likely to visit GP when they had chronic illness. In the total sample, alcohol, sexual intercourse, chronic illness and BMI associated with visiting GP among medical students.

According to the multivariable logistic regression (Table 3), only chronic diseases were significantly associated in the total sample. International medical students were more likely to visit a GP when they had experienced sexual intercourse (AOR=1.86, 95%CI 1.14–3.01, $p=0.012$) and had a chronic disease (AOR=3.22, 95%CI 1.46–7.07, $p=0.004$). On the other hand, Hungarian medical students were more likely to visit a GP when they had chronic disease (AOR=3.70, 95%CI 1.93–7.09, $p<0.001$).

Medical students visit to the psychologist

According to the univariable logistic regression analysis (Table 4), socio-demographic factors that have a significant relationship with visits to a psychologist was sex in both groups, but the year of study was relevant only in the Hungarian group. Health behaviours included alcohol consumption were significantly related to visits to the psychologists in the total sample. Moreover, mental health status, PSS and self-rated mental health had a significant relationship in all groups.

Table 4 indicates that among international students, a higher perception of stress and poor self-rated mental health were associated with a greater likelihood of visiting a psychologist. On the other hand, within the group of Hungarian students, visiting a GP was more probable when they were in clinical years, experienced higher levels of perceived stress, and reported poorer mental health.

With regard to the multivariable analysis (Table 5), there was a significant correlation between gender, alcohol consumption, and PSS in the total sample of the visits to the psychologists. Hungarian medical students were more likely to visit the psychologists when they were in

the clinical years (AOR=1.74, 95%CI 1.00–3.01, $p=0.048$) and had poor self-rated mental health (AOR=2.45, 95%CI 1.31–4.60, $p=0.005$). While female international (AOR=2.21, 95%CI 1.11–4.41, $p=0.024$) students and those who had poor self-rated mental health were more likely to seek psychological help (AOR=3.08, 95%CI 1.47–4.45, $p=0.003$).

Discussion

Main findings

The findings revealed that medical students' utilization of medical assistance from GPs or psychologists remained low, aligning with similar observations made in other studies [1, 4]. Medical students may feel they have the knowledge to overcome their health problems by seeking help from friends or family members [3, 20]. The same opinion has been expressed in a study that students tend to avoid or delay disclosure, and they seek help because of the perceived risk to their future [6, 16]. Meanwhile, in another study, it has been suggested that the reason for coming to professional healthcare was not because it would hinder the students' studies or reduce their achievement because of the disease they were having [4], but they were reluctant to come to the GP for reasons of the type and level of the disease they were experiencing [20, 29].

Our study showed that both Hungarian and international medical students who had chronic illnesses had the possibility to visit the GP. This finding was supported by a study which stated that students had symptoms of chronic diseases, such as respiratory, gastrointestinal, musculoskeletal symptoms or miscellaneous would come to visit the GP [29]. The same thing has also been described by previous studies which stated that health seeking behaviour among medical students might be influenced by the presence or absence of chronic diseases the students had [30]. However, another study claims that only students with symptoms of the disease at a severe stage would come to seek medical assistance [7, 31]. When analysing between local and international students, there may be several things that need to be considered, as it is known in the previous research that the mental health of international students might be influenced by the process of acculturation that they experience [11].

Likewise, students who often engage in risky health behaviours would have an impact on their physical and mental health, so that these students need appropriate health assistance [32]. The current findings suggest that international medical students who were sexually active were more likely to visit a GP. Hobs reports in his research that family doctors are the most common providers of support (47.5–54.8%), less than half of the individuals experiencing unpleasant sexual difficulties sought

help or advice to health professionals [33]. The primary obstacle to students seeking medical care (70.4%) and students in need of sexual health counselling (72.2%) was acceptance of services [34].

The findings of the current study show that students were less likely to come to the psychologist than to the GP. This is of particular concern even though 50.9% of the students reported experiencing poor mental health, they were reluctant to come for psychological help. This might be influenced by the stigmatization of students when they have poor mental health problems [20, 35]. Worries about confidentiality were only seen as a barrier to seeking help for mental health problems [20] to consult friends and/ family informally about symptoms relating to mental health problems [4].

A prior study has revealed that men and women exhibit comparable help-seeking behaviours [36]. However, in the current study, it was observed that female students were more likely to seek the advice of a psychologist, and this finding was also present in the study of Mou, that is, women were more likely than men to take precautions [37, 38]. The likelihood of contracting a disease, how well people respond to treatments, and how frequently they seek medical attention have all been found to be influenced by sex and social circumstances [39]. Another study has claimed that patients' self-reports revealed gender variations in the way they sought medical attention with women saying they contacted their primary care physician more frequently than males for both physical and mental health issues [38, 40].

The study conducted by Sawaha highlights that the academic year affects the search for health assistance [30] similarly to the findings in the current study where clinical students tried to seek help for psychological problems more often by consulting a psychologist. Students in higher academic years had a higher probability to be in the risk pattern of burnout, so they needed to come to the psychologist more often [24]. In addition, this study found a link between psychological visits and perceived stress, and prior research indicated that medical students generally experienced greater levels of perceived stress and emotional distress [24]. A more thorough understanding of how various sorts of stressors affect college students' mental health will certainly allow any such efforts to more accurately identify and offer options to those who need support [41].

The recent findings argue that alcohol consumption was associated with seeking help from a psychologist. Consequently, drinking issues may have a very negative effect on mental health. One recent study showed that drinking alcohol were more likely to have mental health problems [23]. Excessive alcohol consumption and alcoholism can exacerbate pre-existing disorders like depression, or they may lead to the development of new issues,

such as anxiety, depression or significant memory loss [14, 42].

Strengths and limitations

In this study, health issues concerning both general health and mental health were discussed by using self-rated health assessments that are easy to assess by respondents and do not require much time in answering questionnaires. As another strength of the survey, a perceived stress scale that is easily understood by respondents in assessing the perception of stress was used. Nevertheless, despite the use of valid measurements and online survey measure, this study has several limitations. First, the cross-sectional study design may cause result bias. Second, convenience sampling was employed to recruit medical students' participation, which may affect the representativeness of our findings. Third, since the data collection was conducted during the COVID-19 pandemic in Hungary, it may have an impact on health status (including mental health) and healthcare-seeking behaviours of students. Fourth, data on the students' country of origin and the use of secondary care were not available or were not analysed in this study.

Future studies should consider using longitudinal study design, mixed method (qualitative and quantitative), dig deeper into the reasons why students seek medical assistance other than the variables in this study. The reasons why students visit psychology less frequently than to the GP can be explored by in-depth interviews. Future researchers can explore the barriers to seeking help among medical students.

Conclusion

Healthcare-seeking was influenced by socio-demographic characteristics, health behaviour and health issues among medical students. This finding is encouraging medical schools to promote students to ask for assistance and come forward with problems early as well as increase student awareness in order to reduce risky behaviours. Therefore, in addition to their patients, a medical student's future career depends on the ability to fully comprehend healthcare attitudes and to develop solutions that will improve health behaviour and to get appropriate health care.

Abbreviations

GP	General practitioner
OHI	Online health information
USZ	University of Szeged
SRH	Self-rated health
PSS	Perceived stress scale
BMI	Body mass index
OR	Odd Ratio
CI	Confidence Interval

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Authors' Contributions

AU, EP, RM: methodology, formal analysis, writing original draft, interpretation and revise. EP, RM: reviewing and supervision. AU, VZ, AMN, SS, ZM: investigation, conceptualization, interpretation, revise, and editing. All authors have read and approved the final manuscript.

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Data Availability

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

Declarations

Ethics approval and consent to participant

All methods were carried out in accordance with relevant guidelines and regulations. The study protocol was approved by the Human Institutional and Regional Biomedical Research Ethics Committee, University of Szeged, Hungary (license number: 4936). Informed consent was obtained from all subjects.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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