frontiers | Frontiers in Education

TYPE Brief Research Report
PUBLISHED 16 January 2025
DOI 10.3389/feduc.2024.1523310

OPEN ACCESS

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RECEIVED 05 November 2024
ACCEPTED 31 December 2024
PUBLISHED 16 January 2025

CITATION
Pölczman L, Árva D, Győrffy Z, Jámbor M, Végh A, Kristóf G, Purebl G and Girasek E (2025) Enhancing resilience: the impact of a near-peer mentoring program on medical students.
Front. Educ. 9:1523310.
doi: 10.3389/feduc.2024.1523310

Enhancing resilience: the impact of a near-peer mentoring program on medical students

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Introduction: Emerging adulthood is a vulnerable period and can be a crisis for many youth, leading to serious mental health problems. Medical students are especially vulnerable due to their high exposure to stressors, requiring enhanced resilience to cope with academic challenges. This study measured the effectiveness of a near-peer mentoring program in terms of resilience.

Methods: A non-randomised controlled trial was conducted at Semmelweis University involving 133 medical students. The case group (n = 94) comprised students who participated in a mentoring program as mentors or mentees. The control group (n = 39) did not participate in mentoring. Data was collected at two points, 5 months apart, at the semester's start (August 2022) and end (February 2023). Self-report measures included sociodemographics, resilience (Connor-Davidson Resilience Scale), and depression (Depression Anxiety and Stress Scale). Statistical analysis involved descriptive statistics and mixed linear models for repeated-measures ANOVA.

Results: Results showed a significant increase in resilience for the case group compared to the control group (F (1, 129) = 5.578, p = 0.020), with no significant main effect of time. There was a significant interaction effect between intervention and time on resilience (F (1.000, 129.000) = 4.915, p = 0.028). Depression scores showed no significant group difference but a significant main effect of time (F (1.000, 129.000) = 4.725, p = 0.032) and the interaction effect between intervention and time on depression (F (1.000, 129.000) = 4.018, p = 0.047).

Discussion: This mentoring program effectively increased resilience and helped maintain mental health, contributing to developing skilled healthcare professionals—where resilience remains a key strength for 21st-century doctors.

KEYWORDS

medical students, peer mentoring program, resilience, depression, nonrandomised controlled trial

1 Introduction

Near-peer mentoring refers to a mentoring relationship in which a senior student (mentor) provides guidance and support to a fresher student (mentee) (Pölczman et al., 2024). This approach benefits both mentors and mentees by fostering professional and personal growth. Several studies have shown that peer mentoring is an efficient and cost-effective way to help first-year students cope with challenges, reduce stress and prevent burnout, and adjust to the new environment at the beginning of their university career (Singh et al., 2014; Abdolalizadeh et al., 2017; Zhang et al., 2017; Akinla et al., 2018; Lapp et al., 2018; Nimmons et al., 2019). Mentoring can put mentors' previously acquired theoretical knowledge into practice and greatly improve their self-awareness and sense of responsibility (Singh et al., 2014; Kukreja, 2018; Prunuske et al., 2019; Pölczman et al., 2024). Mentors, in particular, often develop greater empathy, enhanced problem-solving and practical skills through their engagement in mentoring activities (Yusoff et al., 2010; Singh et al., 2014; Kukreja, 2018; Prunuske et al., 2019; Mohd Shafiaai et al., 2020). The experiences gained during mentoring are also essential milestones for mentees and mentors alike, as vital skills are also acquired to help students become the best healthcare professionals possible (Pölczman et al., 2024).

However, mentoring can be challenging, with numerous difficulties and limitations. Mentoring relationships can face challenges such as communication barriers, time management issues, and mismatched expectations. For example, mentors may struggle to balance their academic responsibilities with mentoring duties, and mismatched expectations between mentors and mentees can lead to dissatisfaction (Cho and Lee, 2021; Pölczman et al., 2024).

As in previous studies, students reported a wide range of benefits due to their participation in mentoring programs. The most commonly reported benefits were improved social skills and reduced anxiety (Kalén et al., 2012; Kovács and Kovács, 2012; Al-Dubai et al., 2013; Rehman et al., 2014; Chatterton et al., 2018; Altonji et al., 2019; Prunuske et al., 2019; Jordan et al., 2020; Laurence et al., 2020; Mohd Shafiaai et al., 2020; Atlas et al., 2021). Mentees and mentors also receive academic support and professional and personal development (Yusoff et al., 2010; Kalén et al., 2012; Kovács and Kovács, 2012; Al-Dubai et al., 2013; Rehman et al., 2014; Singh et al., 2014; Abdolalizadeh et al., 2017; Zhang et al., 2017; Kukreja, 2018; Altonji et al., 2019; Prunuske et al., 2019; Laurence et al., 2020; Mohd Shafiaai et al., 2020; Atlas et al., 2021). Yusoff et al. (2010) found that a mentoring program at a Malaysian university helped reduce stress in 43% of mentees, helped them adjust to university life, and increased their self-confidence. In addition, the program was also beneficial in improving students' resilience (Yusoff et al., 2010). In a longitudinal study, participants experienced reduced levels of stress and burnout and improved quality of life after participating in a mentoring program (Zhang et al., 2017). In another study, mentors reported that the mentoring experience helped them to cope better with difficulties and new situations (Abdolalizadeh et al., 2017). Kukreja (2018) examined the impact of a 7-month-long mentoring program on mental health and resilience outcomes. The qualitative findings showed that mentors experienced an improvement in their resilience and mental health over time (Kukreja, 2018).

Emerging adulthood is a vulnerable period and can be a crisis for many youths, causing severe mental health problems, such as depression and anxiety (Arnett et al., 2014; Heinen et al., 2017). This is particularly important for medical students, who have to cope with countless challenging situations throughout their demanding university studies (Dyrbye et al., 2006; Dyrbye et al., 2008; Dyrbye et al., 2009). The characteristics of the learning environment influence student mental health, emotional well-being, and academic performance greatly (Dyrbye et al., 2009; Rehman et al., 2014), for instance, by participating in dissections, examination burden and high academic workload (Sándor et al., 2015). According to the international and domestic literature, compared to the general population, medical students and professionals show poor mental health with high rates of mental distress, anxiety, depression, and suicidal thoughts (Dyrbye et al., 2006; Dyrbye et al., 2009; Győrffy et al., 2013; Grant et al., 2015; Rotenstein et al., 2016; Heinen et al., 2017; Moutinho et al., 2017; Torales et al., 2019; Wilkes et al., 2019; Aziz et al., 2020; Jordan et al., 2020; Kaewpila et al., 2020; Rajapuram et al., 2020; Cho and Lee, 2021; Tlili et al., 2021; Whistle, 2021; Langness et al., 2022). Furthermore, the prevalence of burnout syndrome among medical students can be as high as 50% (Dyrbye et al., 2006; Ádám and Hazag, 2013; IsHak et al., 2013; Ádám et al., 2014; Dyrbye and Shanafelt, 2016; Tlili et al., 2021). These problems have a major negative impact on students' lives, mental and physical health, and professional development. Lower academic performance, less commitment to patient care, and cynicism are expected to be detrimental to the mental health of future physicians (Dyrbye et al., 2006; Rotenstein et al., 2016; Moutinho et al., 2017). Mentoring programs can help alleviate these pressures by fostering social support, providing guidance, building students' resilience to manage challenges effectively, and improving their overall well-being and mental health over time (Yusoff et al., 2010; Rehman et al., 2014; Abdolalizadeh et al., 2017; Kukreja, 2018; Altonji et al., 2019; Prunuske et al., 2019). A study found that students with mentors who could provide emotional and social support could cope better with anxiety and support other students (Rehman et al., 2014). Resilience was also found to be lower among medical students compared to the general population (Saeed et al., 2016; Lin et al., 2019). Resilience is described as a flexible ability to adapt, enabling people to succeed and develop positively in the face of challenges, which can be observed in individuals and groups (Howe et al., 2012; Thompson et al., 2016). This suggests that resilience can be learned or changed and depends on social and personal factors (Thompson et al., 2016).

Recent studies have shown that resilient people are less prone to depression (Goldstein et al., 2013) and have lower rates of suicide (Min et al., 2012). Dai and Smith (2023) found several perspectives of resilience to depression. They found that having a clear purpose in life, positive emotions, emotional stability, adaptive coping strategies and social support, and pro-social tendencies (e.g., altruism) have been shown to promote resilience to depression (Dai and Smith, 2023). When individuals learn 'resilience' through mentoring or coaching, depression can be effectively prevented (Thompson et al., 2016).

The aim of the present study is to investigate whether a near peer mentoring program can impact student resilience and mental health outcomes in a medical school setting.

2 Materials and methods

2.1 Study design

A non-randomised controlled trial was conducted at Semmelweis University, Faculty of Medicine, Budapest, Hungary. The sample

consisted of two groups: case and control groups. The case group included medical students enrolled in a mentoring program as mentors or mentees at that time. The medical students in the control group did not participate in the mentoring program. The grouping was independent of this study. A volunteer sample of students participated in the program and the study. Both groups were measured at two time points within a 5-month interval: at the beginning of the semester in August 2022 (Time-1, T1) and at the end of the semester in February 2023 (Time-2, T2). This was before and after participation in the mentoring program for the case group.

Convenience sampling was used, and responses were collected using a secure and anonymous online survey sent to all Hungarian medical students ($n = 300$) via email. It took approximately 10 min to complete the survey. The paired data analysis included only participants who participated in both data collections. Responses from students who did not complete both surveys were removed from the data set.

2.2 Participants

Altogether, 133 medical students participated in both data collections. To follow up with participants while ensuring anonymity, participants created a five-digit code for themselves that, among others, included the capital letter of the place of birth and the number of siblings they have. Based on these codes provided by the participants, we paired their responses for data analysis. The data was anonymized, so it did not contain any personal identifiers. The participants took part in the study voluntarily, and their data confidentiality and anonymity were ensured, and they did not receive any benefit in return for participation.

2.3 Intervention

Semmelweis University offers a variety of physical, psychological, and social well-being activities. The Semmelweis Mentoring Program is part of the student well-being curriculum. The program was established in September 2019. In the academic year of 2022/2023, 120 first-year students (mentees) and 112 peer mentors participated in the mentoring program. Since then, the program has outgrown itself, and the demand for mentoring has tripled. Our Mentoring Program aims to help first-year students adapt to university life and to help students, both mentors and mentees, become resilient.

Mentors are minimum third-year students trained at the beginning of every semester on the following topics: boundaries of competence and goals in mentoring, stress and time management, assertive communication, and mental health support. They receive training in psychological/psychiatric emergencies and are taught how to initiate management in such circumstances. Furthermore, supplementary workshops are offered at regular intervals throughout the academic semester. For example, the mentors can participate voluntarily in resilience and behavior stress management programs. The latter is an international standardized behavioral stress management program (Kirby et al., 2006), a culturally adapted and standardized intervention in Hungary (Stauder et al., 2016). There is a combination of optional and mandatory attendance in the various parts.

The strength of the program lies in the training and workshops offered to mentors to monitor their work and commitment by keeping a Mentor Diary and offering two group supervision sessions per semester, which is unique among mentoring programs. Mentors also learn and teach their mentees how to manage and cope with stress more effectively. They also learn soft and adaptive problem-solving skills. These are taught and encouraged through training and workshops and refined through supervision.

Throughout the program, during supervision and in Mentor Diaries, students reflect on their thoughts and experiences. The Mentor Diary is a structured tool designed to guide mentors in reflecting on their mentees' needs and mentoring work. It includes specific guiding questions and sections for mentors to note the frequency of meetings with the mentee and the key topics covered during those interactions.

The supervision sessions occur in a group setting with 8–15 students and a facilitator who is a medical doctor, a graduate of the University, or a psychologist. These sessions provide students with a safe place to ask questions, an opportunity to examine their personal experiences and interactions, and peer support. Self-reflection and self-awareness, as well as the peer support that students provide for each other, are also important impact factors of the program.

2.4 Description of materials

The self-completed questionnaire was composed of demographic questions and two following scales:

1. Demographic information: gender, age, year in medical school, and participation in the mentoring program.
2. CD-RISC - Connor-Davidson Resilience Scale: validated for use in Hungarian (Járai et al., 2015). and developed to assess the level of resilience. It contains 10 items, scored on a 5-point Likert scale from 0 to 4. A higher overall score indicates a higher degree of resilience.
3. DASS-21 - Depression Anxiety and Stress Scale: This 21-item scale is scored on a 4-point Likert scale from 0 to 3 and is validated for use in Hungarian (Szabó, 2009). The scale is divided into 3 subscales: depression, anxiety, and stress. Every subscale contains 7 items. The score on each subscale is obtained by adding the items together. A higher score reflects a higher level of depression, anxiety, and perceived stress. For the analysis, only the depression subscale was used.

2.5 Statistical analysis

Statistical analysis was performed using SPSS 28 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics were applied to the demographic characteristics and all other variables (resilience and depression). Levene's normality tests were performed, but the results did not achieve statistical significance ($p > 0.05$), so parametric tests were then used.

A mixed linear model approach to repeated measures ANOVA was carried out to examine the difference in mean scores between the case group and control group across all time points (main effect). Additionally, it was used to evaluate potential interaction effects

between the within-subjects factor (time) and the between-subjects factor (intervention). A mixed linear model was chosen for its ability to handle repeated measures data, which is particularly suitable for non-randomised controlled trials. The models were adjusted for the following covariates due to their potential influence on resilience and mental health outcomes: gender and age. The significance level was fixed at 0.05.

3 Results

3.1 Sample demographics

A total of 133 medical students were included in the study. Thirty out of the participants were male (23%), and one hundred-three were female (77%). Answers came from the 18–26 age group, and the mean age of participants was 20.55 years (SD = 1.948).

The case group consisted of 94 students who participated in the mentoring program, representing 71% of the total sample. This group contained fifty (35%) mentees and forty-four (33%) mentors. Forty-six of the students were in their first year, and the rest of the participants were in their second year or above. The control group consisted of thirty-nine students (29%) who did not take part in the mentoring program. In this group, 12 students were in their first year. The characteristics of the participants are presented in Table 1.

3.2 Primary outcome

Analysis of CD-RISC scores of the group main effect showed that there was a significant increase in the resilience score in the case group (F(1, 129) = 5.578, p = 0.020) compared to the control group. The main effect of gender (F(1, 129) = 2.748, p = 0.100) and age (F(1, 129) = 0.303, p = 0.583) showed no significant increase in the resilience score. The main effect of time was not significant in the CD-RISC scores (F(1.000, 129.000) = 0.038, p = 0.846). The interaction effect between intervention and time was significant on resilience (F(1.000, 129.000) = 4.915, p = 0.028). There was a statistically significant increase in the resilience scores for the case group following the intervention, with the participants achieving scores higher than the control group, whose scores significantly decreased over time (Figure 1). The interaction effect between gender and time (F(1.000, 129.000) = 0.281, p = 0.597); and age and time (F(1.000, 129.000) = 0.010, p = 0.921) was not significant. The changes in CD-RISC scores over time in both groups can be seen in Table 2.

TABLE 1 Characteristics of the sample.

Characteristic	Case group (n = 94)	Control group (n = 39)
Gender		
Male	17	13
Female	77	26
Year in medical school		
Year 1	46	12
Year 2	4	9
Year 3	16	7
Year 4	20	3
Year 5	5	4
Year 6	3	4

3.3 Secondary outcome

Analysis of DASS-Depression scores of the group main effect showed that there were no significant differences in the depression score in the case group (F(1, 129) = 1.004, p = 0.318) compared to the control group. The main effect of gender (F(1, 129) = 2.663, p = 0.105) and age (F(1, 129) = 0.039, p = 0.843) showed no significant increase in the depression score. The main effect of time was significant in the depression scores (F(1.000, 129.000) = 4.725, p = 0.032). The interaction effect between intervention and time was significant on depression (F(1.000, 129.000) = 4.018, p = 0.047). There was a statistically significant increase in depression scores in the control group, with the participants achieving scores higher than the case group following the intervention, whose scores remained stable over time (Figure 2). The interaction effect between gender and time (F(1.000, 129.000) = 0.915, p = 0.341); and age and time (F(1.000, 129.000) = 1.646, p = 0.202) was not significant. The changes in DASS-Depression scores over time in both groups can be seen in Table 2.

4 Discussion

In this study, the resilience among the case group was significantly higher compared to the control group. It could be reasoned that students who participated in the mentoring program may already have better coping mechanisms or greater resilience to academic stressors. This self-selection process may attract individuals who are more adept at managing the demands of their academic workload. Resilience showed significant improvement in the case group compared to the control group at the end of the semester. The results showed that those students who participated in the mentoring program had higher levels of resilience, while those who did not participate had decreased levels of resilience over time. There was no effect of gender and age on this trend. The findings of previous research are consistent with the findings of this study that near-peer mentoring programs have been shown to help mentors increase their resilience (Yusoff et al., 2010; Chatterton et al., 2018; Kukreja, 2018).

In previous years, research on mentoring's impact on depression has found mixed results. Kukreja (2018) found no significant changes in mentors' overall mental health or depression levels over the course of the examined period (Kukreja, 2018). In a cross-sectional study, students who participated in the one-year mentoring program did not have a higher level of mental health or quality of life than students who did not participate in the program (Bechara Secchin et al., 2020). Contrasting studies revealed that participation in a mentoring program resulted in a reduction in depression, anxiety, and stress levels among mentees (Sonawane et al., 2021; Harra and Vargas, 2023).

In this study, depressive symptoms increased significantly in the control group compared to the case group at the end of the semester. The results demonstrate that students who did not participate in the mentoring program had more depressive

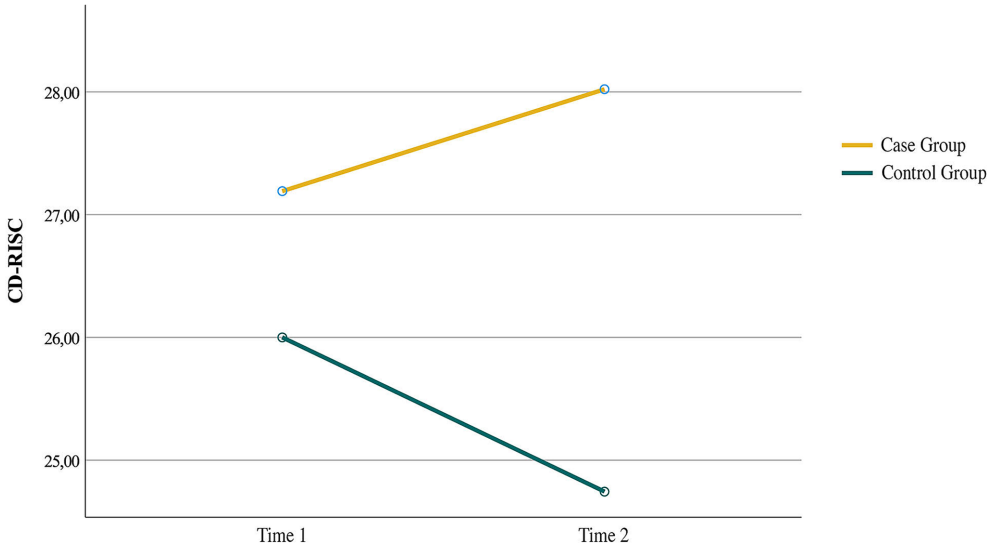

FIGURE 1
The changes in resilience score over time in both groups.

TABLE 2 Comparison of case and control group scores on the CD-RISC and DASS-depression subscale across time points.

	Case group (*n* = 94)		Control group (*n* = 39)		Group main effect, *P*	Time main effect, *P*	Interaction effect, *P*
Dependent variables[a]	Time 1 M (*SD*)	Time 2 M (*SD*)	Time 1 M (*SD*)	Time 2 M (*SD*)			
CD-RISK	27,19 (*5,91*)	28,02 (*6,15*)	26,00 (*6,36*)	24,74 (*6,62*)	0.020*	0.846	0.028*
DASS-D	5,08 (*5,06*)	5,25 (*5,11*)	4,87 (*4,51*)	6,69 (*5,70*)	0.318	0.032*	0.047*

[a]CD-RISC, Connor Davidson Resilience Scale; DASS, Depression Anxiety Stress Scales; D, depression subscale.
**p*-value is < 0.05.

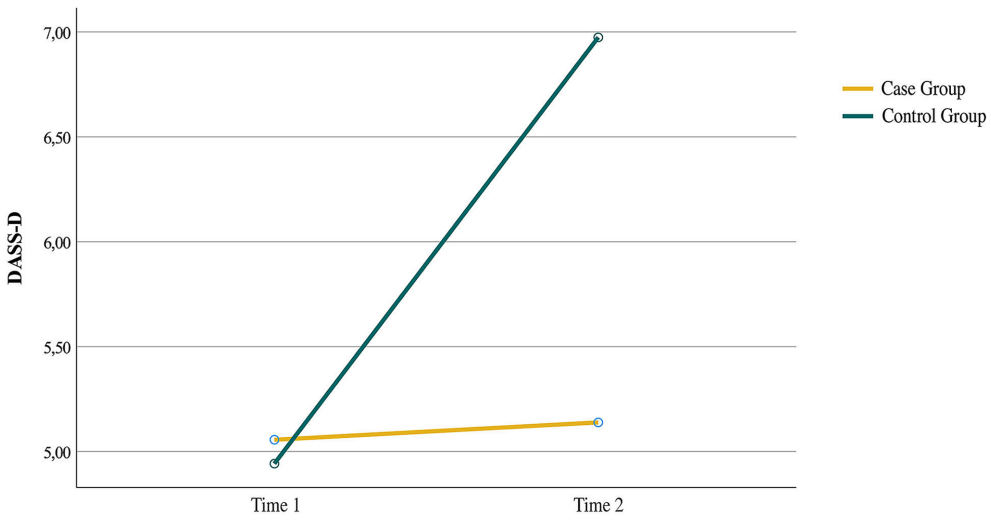

FIGURE 2
The changes in depression score over time in both groups.

symptoms, while those who participated remained stable over time. There was no effect of gender and age on this trend. The results also showed that changes in depressive symptomatology over time may be attributed to the timing of our assessments, which were conducted at the end of the semester following the exam period. It is plausible that the stress and pressure associated with academic

exams could have influenced participants' depressive symptoms, resulting in fluctuations observed over time. It is important to note that despite the stress and fatigue, such an impact on students' mental health was still achieved. This also shows that there is a correlation between participation in the program and a more balanced mental health.

The program did not improve symptoms of depression, but it would not have been realistic to expect the mentoring program to do so, nor is there an intervention for depression in the program. However, the mentoring program has been shown to be protective against worsening symptoms of depression, which may be a consequence of resilience. This underlines the importance of building resilience, and mentoring programs like this.

It is not only young adults in transition age who are more vulnerable to mental health problems, but 75% of mental health problems are established by age 24 (Kessler et al., 2005; Heinen et al., 2017), underscoring the crucial role of prevention, effective diagnosis and treatment in emerging adulthood. In addition, since the COVID-19 pandemic, the number of people living with depression and anxiety has risen significantly (WHO, 2022). Untreated mental health problems can have serious consequences that affect a young adult's ability to lead fulfilling lives in the future. Therefore, the prevention of more serious mental health problems is imperative (Kaligis et al., 2023).

The more psychosocial resources are available to emerging adults, the lower their levels of depression, stress and anxiety (Sulimani-Aidan and Tayri-Schwartz, 2021; Brito and Soares, 2023). In a sample of emerging adults, Brito and Soares (2023) have found a negative predictive relationship between depression and meaning in life. According to the researchers, meaning in life is associated with a clear sense of purpose, and the satisfaction that results from this experience can reduce undesirable emotional states and promote resilience to depression (Brito and Soares, 2023; Dai and Smith, 2023). According to Pereira et al. (2018), social support and the ability to engage socially is a source of well-being. The emotional benefits of relationships with friends and family, known as social support, are of great relevance in emerging adulthood (Pereira et al., 2018). A large body of literature suggests that social support, both directly and indirectly - through resilience - promotes well-being, burnout, and depression prevention (Dyrbye et al., 2009; Howe et al., 2012; Thompson et al., 2016; Kukreja, 2018; Dai and Smith, 2023).

Mentoring relationships allow mentees to improve their social and problem-solving skills through socialization processes. This, together with social support, enables mentees to adapt more successfully to university life and its challenges and to connect better with their peers, all of which contribute to their resilience, which is essential for navigating complex professional environments in the future. Findings from previous studies suggest that a sense of belonging significantly impacts young people's resilience and also serves as an explanation of how mentoring relationships contribute to resilience. Sense of belonging could mediate the association between mentoring relationships and resilience (Sulimani-Aidan and Tayri-Schwartz, 2021). Mentoring relationships and mentoring programs allow mentors to gain a sense of belonging and self-awareness. Mentoring programs help students practice empathy, which has been shown to contribute to mental health (Kukreja, 2018).

The results indicated that the mentors experienced several professional, personal, social, and emotional benefits following their participation in the mentoring program. The most frequently mentioned benefits were the development of their self-awareness and social support, both received from one another and from the mentees. Additionally, mentors reported that the program had facilitated soft skills development, including time management, problem-solving abilities, a sense of usefulness, and self-efficacy (Pölczman et al., 2024). Mentors' growth in these key areas likely enhanced the quality of support provided to mentees, fostering a positive mentoring relationship. These skills are also fundamental for their future professional roles.

Some soft skills, for example, time management of mentors, are also developed indirectly. Not only do they develop them while helping their mentees, but they also have to balance their mentoring role with, for example, their own tasks and responsibilities. Other programs also recognize the importance and effectiveness of mentor training in developing students' mentoring and communication skills (Usmani and Omaeer, 2016; Abdolalizadeh et al., 2017; Kukreja, 2018). In their study, Chatterton et al. found that as a result of their mentoring program and the training that preceded it, mentors reported increased resilience. Mentors reported that they themselves had a better understanding of university procedures and processes, which helped them in their own journey through medical school, and that their soft skills and understanding of resilience and professionalism developed as a result of taking part in the training and peer mentoring program (Chatterton et al., 2018). The question rightly arises as to whether mentoring programs have a place inacademic development. Providing support and guidance for the adjustment to university life is essential for medical students (Cho and Lee, 2021). In one study, mentors stated that mentoring was instrumental in developing characteristics and skills essential for success in the field of medicine (Mohd Shafiaai et al., 2020). Therefore, it is worth considering how peer mentoring can be applied more widely in the medical school curriculum (Prunuske et al., 2019). In light of the finding that mentoring did not directly alleviate depression but served as a protective factor against its worsening, it is important to explore how future mentoring programs can integrate mental health support. One potential approach is to train mentors to recognize early signs of depression and guide students toward appropriate mental health resources. Additionally, embedding mental health strategies into the mentoring framework—such as teaching coping mechanisms and promoting a supportive, empathetic environment—could enhance the program's ability to address depressive symptoms. These efforts would help ensure that mentoring not only contributes to academic and personal growth but also supports students' emotional well-being.

4.1 Limitations

The main limitation of this study is that the sample consisted of students from a single institution. While the single-institution setting may limit generalizability, this focused approach allowed us to analyze program impacts within a controlled environment. Future studies should explore long-term outcomes and the adaptability of mentoring programs across diverse healthcare settings, or include multiple higher education institutions, such as those with diverse learning environment, geographical and cultural contexts, to enhance the applicability of findings. Furthermore, a larger sample size would have increased the reliability of the findings, and more far-reaching conclusions could have been drawn. In our study, 50 mentees, 44 mentors, and 39

participants in the control group completed the survey. Dividing the control group into smaller subgroups (e.g., first-year students and older students not participating in the program) would have resulted in very small sample sizes, limiting reliability. Future research should aim to recruit larger, balanced samples and implement matched control groups to allow more detailed subgroup analyses of mentors and mentees, which could provide clearer insights into their respective experiences and benefits.

Self-selection bias is a potential limitation, as participants who chose to engage in mentoring may already differ from those who did not. This inherent difference could influence the observed outcomes. Future studies could explore alternative methods to better understand and address this bias, such as conducting qualitative interviews to capture the motivations and characteristics of participants and non-participants. This approach could offer deeper insights into the potential influence of self-selection on study outcomes. It must also be acknowledged that participation in our study was voluntary, which might have biased our results. If such a bias was present, then less motivated and less interested students may be under-represented in the sample. It is possible that non-respondents were simply less engaged rather than less satisfied, as the extent of their participation is unknown. The interpretation of the results should be done in this context.

While we focused on depression due to its clinical relevance, future studies will incorporate anxiety and stress measures for a holistic analysis to provide a more comprehensive understanding of the mentoring program's effects.

However, the strength of this study is the longitudinal nature of data collection. It is unique in the literature on mentoring programs. Despite the limitations, the authors believe that this study's general conclusions are firm and provide valuable information on the need for mentoring programs in medical schools. The results of the present study suggest that the evidence in support of mentoring is promising and that further longitudinal research is needed.

5 Conclusion

We recommend integrating structured mentoring programs into medical school curricula and providing training to mentors to maximize program effectiveness. Mentoring programs not only enhance student resilience but also contribute to developing resilient healthcare professionals, which can improve the quality of patient care. For instance, resilient healthcare professionals are better prepared to handle high-pressure situations, maintain empathy in patient interactions, and adapt to rapidly evolving medical environments, leading to better patient outcomes. The key strength of 21st-century doctors lies in their resilience.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Regional, Institutional Scientific, and Research Ethics Committee of Semmelweis University (protocol number: 37/2022). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

LP: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. DÁ: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. ZsG: Conceptualization, Methodology, Validation, Writing – original draft, Writing – review & editing. MJ: Conceptualization, Data curation, Writing – original draft, Writing – review & editing. AV: Conceptualization, Data curation, Writing – original draft, Writing – review & editing. GK: Data curation, Writing – original draft, Writing – review & editing. GyP: Supervision, Writing – original draft, Writing – review & editing. EG: Formal analysis, Supervision, Writing – original draft, Writing – review & editing, Investigation.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. The contribution of the second author, DÁ, was supported by the Scientific Foundations of Education Research Program of the Hungarian Academy of Sciences (SZKF-12/2021).

Acknowledgments

We wish to thank all the mentors and mentees of the Semmelweis Mentoring Program for participating in this study and all other collaborators, the staff of the Mentoring Program who contributed to the implementation of the study. We would also like to thank Professor Kellermayer for his utmost support and his complete enthusiasm for the program.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

GyP declared that he was an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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