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Effects of intra-class peer mentorship intervention programme on the academic performances of academically underperforming medical students in Nigeria

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Abstract

Background A significant gap exists in understanding the effectiveness of intra-class (same-class) level peer mentorship programmes designed to enhance academic performance, well-being, and student involvement among underperforming medical students. This study assessed the effectiveness of intra-class (same-class) peer mentorship programme on the academic performances, subjective well-being and school engagement of academically underperforming medical students in Nigeria.

Methods This was a quasi-experimental research consisting of the pretest-posttest control design at Nnamdi Azikiwe University, Awka, Nigeria. Preclinical medical students from same class level were categorised into three groups: 7 academically underperforming students (mentees) scoring below 45% on the continuous assessment test (CAT), 12 mentors scoring 70% or above, and 30 controls scoring between 50% and 70%. Participants completed the Subjective Vitality Scale (SVS) and the self-University Student Engagement Inventory (USEI) before and after the 6-month programme, led by an experienced educationist. A post-programme CAT assessed academic performance, and quantitative data were analysed using paired-samples t-tests to evaluate changes in academic performance, SVS and USEI. The dimensions of students' subjective vitality and the school engagement were considered in the analysis.

Results A total of 49 students were included in the study, with 7 (14.3%) in the mentee group, 12 (24.3%) in the mentor group and 30 (61.2%) in the control group. The same-class peer mentorship intervention led to a significant improvement in CAT scores for the mentee group, with their median score rising from 40.0 to 70.0% ($p = 0.003$),

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while the control group's median slightly decreased. The mentee group's SVS ($p=0.722$) and USEI ($p=0.388$) scores non-significantly improved post-intervention. However, specific USEI items revealed significant post-intervention improvements in mentees' classroom engagement or increased participation in discussions ($p=0.001$) and enjoyment of school ($p=0.031$). SVS items showed non-significant differences between groups post-intervention.

Conclusion The same-class peer mentorship intervention significantly improved CAT scores among academically underperforming medical students, with modest gains in SVS and USEI scores. While overall vitality and engagement changes were not significant, classroom engagement improved. These findings support intra-class peer mentorship in medical education.

Keywords Academic achievement, Energy, Promotion, Survival, Vitality

Introduction

Medical education is inherently challenging, often placing significant academic, emotional, and physical demands on students [1]. Academically underperforming to meet these demands can lead to poor academic performance, increased stress, and a heightened risk of attrition, particularly in resource-limited settings like Nigeria [1]. A previous study at a Nigerian university explored the influence of factors such as gender, programme of study, and Cumulative Grade Point Average (CGPA) on student dropout rates. The results showed that gender, CGPA, and programme of study significantly affected dropout rates [2]. Notably, 41.42% of male students and 38.94% of female students dropped out before their expected graduation, with 68.75% of students in certain programmes not completing their degrees. Furthermore, 85.05% of students who started with a third-class CGPA left before their expected graduation year [2].

Peer mentorship programmes have been increasingly recognized as a valuable intervention for supporting students facing academic difficulties [3]. By leveraging the experience and guidance of peers who have successfully navigated similar challenges, such programmes can provide both academic support and psychosocial benefits and could provide enhanced subjective vitality, and overall student engagement [3]. Subjective vitality reflects an individual's self-perceived sense of energy, enthusiasm, and alertness, contributing to their overall well-being and motivation [4, 5]. It encompasses physical, mental, and emotional vitality, and is linked to psychological health, social support, autonomy, and competence [6, 7].

One of the best ways to adjust to the challenges of life as a medical student is through interaction with other students who are a little farther along in the process. This led to the concept of peer mentorship. The concept of peer mentorship is rooted in the idea that students are more likely to engage with and benefit from advice provided by individuals who share similar experiences and understand the unique pressures of medical training [8]. Previous studies have shown that peer mentorship can improve academic outcomes, enhance student

engagement, and reduce feelings of isolation and stress [9–12]. In the context of medical education, where the stakes are high and the environment is often competitive, such interventions may be particularly beneficial. No prior study has utilised intra-class (same-class) peer mentors in low- and middle-income settings. Previous peer mentoring programme typically paired members of each incoming class with mentors from the higher-year class [9–12]. A significant gap exists in understanding the effectiveness of peer mentorship-based intervention programmes designed to improve academic performance, subjective vitality, and overall student engagement among academically underperforming medical students within the context of same-class level mentoring. It is essential to highlight the effect that same-class level students can have on each other in mentoring relationships [13].

By assessing both the academic and psychosocial effects of the programme, this research sought to provide evidence for the broader implementation of peer mentorship as a supportive strategy in medical education. This study evaluated the effectiveness of a same-class level peer mentorship-based intervention programme designed to improve academic performance, subjective vitality, and overall student engagement among academically underperforming medical students in Nigeria.

Materials and methods

Study design and setting

This study is part of a larger study that adopted a mixed method approach, with the protocol and preliminary data published elsewhere [14, 15]. However, the current study employed a pretest posttest control design to assess the impact of an intra-class (same-class) peer mentorship-based intervention on academically underperforming medical students' academic performance and psychosocial well-being. The research was conducted at Nnamdi Azikiwe University, Awka, Nigeria, between May 2024 and October 2024.

Participants

One hundred and forty-four participants (preclinical medical students) for the 2022/2023 academic session were assessed for eligibility at Nnamdi Azikiwe University, Awka, Nigeria, with 49 finally constituting the mentee ($n=7$), mentor ($n=12$) and control groups ($n=30$), as presented in the current study. Participation was voluntary, and informed consent was obtained from all students. The preclinical medical students were categorised into three groups: academically underperforming students (mentees), mentors and controls. Mentees were identified based on their performance in a Continuous Assessment Test (CAT) in physiology, with seven students scoring below 45% recruited as mentees. Twelve students scoring 70% or above were recruited as mentors while thirty students scoring between 50% and 70% were recruited as controls.

Inclusion criteria included all preclinical medical students identified as academically underperforming or controls based on their CAT scores. Exclusion criteria included students with scores above 45% who declined participation as controls, as well as those under the age of 18 years.

Intervention

The intervention consisted of a structured same-class peer mentorship programme, where academically underperforming students (mentees) were paired with high-performing peers (mentors) from the same class. The mentors were trained by the researchers on effective mentoring techniques, communication skills, and maintaining confidentiality. Training sessions lasted for 6 h and included topics such as the role of a mentor, goal-setting, and strategies for academic improvement. This training also included etiquette in conversations, the roles of the peer mentor and those of the mentees, instructional procedures and modes for the programme, contents to be taught and limits of the mentor as well as the mentee. The mentorship programme lasted for six months, with regular weekly meetings between mentors and mentees. These meetings focused on addressing academic challenges, setting academic goals, and providing emotional support. The programme also included group activities aimed at fostering a sense of community and shared learning.

Data Collection

Data collection occurred at two points: before the intervention (baseline) and after the intervention (post-intervention). The following instruments were used:

1. Academic performance: Participants' CAT scores were recorded at baseline and after the intervention

to assess changes in academic performance. Academic achievement is typically measured through continuous assessments and the cumulative grade point average (CGPA) achieved by the student [16].

2. Subjective Vitality Scale (SVS): The SVS is a validated tool used to measure physical and mental energy levels [16, 17]. The SVS was developed by Ryan and Frederick [17, 18]. Originally, the reliability coefficient for SVS using Cronbach Alpha reliability index was 0.84, other researchers have reported reliability coefficients ranging between 0.80 and 0.91 [17, 18]. Participants completed the SVS at both time points.
3. University Student Engagement Inventory (USEI): The USEI was used to assess emotional, behavioural, and cognitive engagement in university life. This tool was administered at baseline and post-intervention. The University Student Engagement Inventory (USEI) was devised by Maroco et al., and included behavioural, cognitive, and emotional dimensions of academic engagement with university students. The behavioural dimension is related to positive normative class behaviours (e.g., respecting the social and institutional rules) [19]. The cognitive dimension refers to students' thoughts, perceptions, and strategies related to the acquisition of knowledge or development of competencies to academic activities (e.g., learning approaches). The emotional dimension refers to positive and negative feelings and emotions related to the learning process, class activities, peers, and teachers. A recent study conducted in nine different countries/regions from Europe, North and South America, Africa, and Asia ratified that USEI has high validity and reliability for data on student engagement [20].

Data analysis

Quantitative data were analysed using SPSS version 26.0 (IBM Corporation). Paired-samples t-tests were conducted to compare pre- and post-intervention scores on the CAT, SVS, and USEI. The mean \pm standard deviation or median and interquartile range statistics were adopted for the quantitative data, where appropriate. A p -value less than 0.05 was considered statistically significant.

Ethical considerations

Prior to the commencement of the study, ethical approval was obtained from Nnamdi Azikiwe University Teaching Hospital, Nnewi Research Ethics Committee: with approval number: (NAUTH/CS/66/VOL.15/VER.3/337/2023/93). Participation was voluntary, and all participants provided informed consent. Confidentiality was maintained throughout the study. Confidentiality

Table 1 Socio-demographic characteristics of the study participants (mentees and controls)

	Total (n = 37)	Mentee (n = 7)	Control (n = 30)	p-value
Age Group (years)				
18–20	19 (51.4)	3 (42.9)	16 (53.3)	0.744
21–25	17 (45.9)	4 (57.1)	13 (43.3)	
26–30	1 (2.7)	0 (0.0)	1 (3.3)	
Gender				
Female	17 (45.9)	3 (42.9)	14 (46.7)	0.999
Male	20 (54.1)	4 (57.1)	16 (53.3)	
Repeated Course				
No	36 (97.3)	6 (85.7)	30 (100.0)	0.421
Yes	1 (2.7)	1 (14.3)	0 (0.0)	
Residence Place				
Rural	11 (29.7)	0 (0.0)	11 (36.7)	0.075
Semi-Urban	8 (21.6)	3 (42.9)	5 (16.7)	
Urban	18 (48.6)	4 (57.1)	14 (46.7)	
Residence Type				
Lives Off Campus	29 (78.4)	5 (71.4)	24 (80.0)	0.999
Lives On Campus	8 (21.6)	2 (28.6)	6 (20.0)	
Guardian Income (USD)				
12.8–32.0	7 (18.9)	3 (42.9)	4 (13.3)	0.163
32.1–64.1	9 (24.3)	2 (28.6)	7 (23.3)	
64.2–96.1	5 (13.5)	0 (0.0)	5 (16.7)	
96.2–128.1	5 (13.5)	0 (0.0)	5 (16.7)	
128.2–320.3	3 (8.1)	0 (0.0)	3 (10.0)	
320.4–640.6	4 (10.8)	0 (0.0)	4 (13.3)	
640.7 and above	4 (10.8)	2 (28.6)	2 (6.7)	

was maintained throughout the study by ensuring that participants’ identities were not linked to their data at any point. All personal information was stored separately from the study data, and unique identification codes were assigned to participants for data analysis. During the analysis phase, the data was fully anonymised to prevent any potential identification of individual participants. Additionally, access to sensitive data was restricted to only the primary researchers, and secure data storage systems were used to safeguard the information. Trial registration: Pan African Clinical Trial registry, PACTR202405546896613.

Results

Participant characteristics

The socio-demographic characteristics of the study participants is shown in Table 1. The age distribution between the groups showed no significant differences ($p=0.744$), with the majority of students being between 18 and 25 years old. Gender distribution was nearly equal in both groups, with no significant differences observed ($p=0.999$). All the participants were in their second year (200 Level) of study, with no significant variation between

the groups ($p=0.898$). Only one student had repeated a course, belonging to the mentee group, but this difference was not statistically significant ($p=0.421$). The residence place and type also did not show significant differences, although there was a trend towards more mentees living in semi-urban areas ($p=0.075$). Guardian income showed variability, but no significant differences were found between the groups ($p=0.163$).

CAT score improvement after intervention for the mentees versus controls

Data in Table 2 show the overall pre and post-intervention CAT, SVS and USEI scores of the study participants (mentees and controls). Prior to the intervention, the control group had a median CAT score of 60.0 (IQR 52.0–66.0), while the mentee group had a significantly lower median score of 40.0 (IQR 39.0–43.0) ($p=0.0001$). Following the peer-mentorship intervention, the mentee group showed a significant improvement in CAT scores, with a post-intervention median of 70.0 (IQR 66.0–73.0) compared to the control group’s median of 57.0 (IQR 51.0–60.0) ($p=0.003$). This indicates that the

Table 2 Overall pre and post-intervention CAT, SVS and USEI of the mentees vs. controls and mentees vs. mentors

Measure	Total (Mentees + Controls)	Mentee	Control	p-Value (Mentees vs. Controls)	Total (Mentee + Mentor)	Mentee	Mentor	p-Value (Mentees vs. Mentor)
Pre-intervention (CAT)	60.0 (50.0–66.0)	40.0 (39.0–43.0)	60.0 (52.0–66.0)	0.0001**	76.0 (43.0–80.0)	40.0 (39.0–43.0)	79.0 (76.0–80.0)	0.0001**
Post-intervention (CAT)	58.0 (54.0–64.0)	70.0 (66.0–73.0)	57.0 (51.0–60.0)	0.003**	73.58 ± 9.08	68.57 ± 8.85	76.5 ± 8.19	0.064
Pre-intervention (USEI)	63.0 (59.0–64.0)	57.0 (50.5–61.5)	64.0 (62.0–64.0)	0.006**	58.32 ± 5.25	55.86 ± 6.54	59.75 ± 3.96	0.122
Post-intervention (USEI)	55.95 ± 6.4	57.86 ± 8.8	55.5 ± 5.81	0.388	57.0 ± 6.78	57.86 ± 8.8	56.5 ± 5.68	0.686
Pre-intervention (SVS)	31.38 ± 6.51	28.86 ± 9.42	31.97 ± 5.68	0.261	27.37 ± 9.56	28.86 ± 9.42	26.5 ± 9.94	0.618
Post-intervention (SVS)	28.32 ± 8.94	29.43 ± 8.72	28.07 ± 9.12	0.722	28.95 ± 7.63	29.43 ± 8.72	28.67 ± 7.33	0.841

Table 3 Comparison of the pre-intervention SVS parameters between the mentees and controls

Statement	Total	Mentee	Control	p-Value
At this moment I feel alive and vital	5.0 (4.0–6.0)	4.0 (1.5–4.0)	5.0 (4.0–6.0)	0.036**
I don't feel very energetic right now	3.22 ± 1.44	3.86 ± 1.95	3.07 ± 1.28	0.194
Currently I feel so alive I just want to burst	2.68 ± 1.36	2.57 ± 1.51	2.7 ± 1.34	0.825
At this time I have energy and spirit	4.51 ± 1.48	4.0 ± 1.63	4.63 ± 1.45	0.316
I am looking forward to each new day	6.24 ± 1.34	5.71 ± 2.14	6.37 ± 1.1	0.252
At this moment I feel alert and awake	5.49 ± 1.61	4.86 ± 2.12	5.63 ± 1.47	0.256
I feel energised right now	4.65 ± 1.75	4.57 ± 2.57	4.67 ± 1.56	0.899

peer-mentorship programme had a significant positive impact on the academic performance of academically underperforming students.

CAT score improvement after intervention between the mentees and mentors

Data in Table 2 also show the overall pre and post-intervention CAT, SVS and USEI of the study participants (mentees and mentors). The pre-intervention CAT scores for mentors (79.0) were significantly higher than for mentees (40.0), with a p-value of 0.0001. However, the post-intervention CAT scores showed a reduction in the difference between the two groups, with mentees scoring 68.57% and mentors 76.5% ($p = 0.064$).

Subjective vitality scale (SVS) improvement after intervention between the mentees and controls

The comparison of the pre-intervention SVS parameters between the mentees and controls is shown in Table 3, while the comparison of the post-intervention SVS parameters between the mentees and controls is shown in Table 4. The pre-intervention SVS scores showed no significant differences between the groups ($p = 0.261$). The mentee group had a mean SVS score of 28.86 ± 9.42 , compared to 31.97 ± 5.68 in the control group. After the intervention, there was a slight improvement in the mentee group's SVS scores (mean 29.43 ± 8.72), although this was not statistically significant compared to the control group (mean 28.07 ± 9.12 ; $p = 0.722$).

Table 4 Comparison of the post-intervention SVS parameters between the mentees and controls

Statement	Total	Mentee	Control	p-Value
At this moment I feel alive and vital	4.43 ± 1.77	4.29 ± 1.25	4.47 ± 1.89	0.812
I don't feel very energetic right now	3.08 ± 1.64	2.14 ± 1.46	3.3 ± 1.62	0.093
Currently I feel so alive I just want to burst	2.76 ± 1.79	3.0 ± 2.08	2.7 ± 1.74	0.695
At this time I have energy and spirit	4.03 ± 1.67	4.71 ± 1.11	3.87 ± 1.76	0.233
I am looking forward to each new day	5.19 ± 1.79	5.43 ± 1.81	5.13 ± 1.81	0.701
At this moment I feel alert and awake	4.86 ± 1.84	5.43 ± 1.9	4.73 ± 1.84	0.376
I feel energised right now	3.97 ± 1.88	4.43 ± 2.07	3.87 ± 1.85	0.484

Subjective Vitality Scale (SVS) improvement after intervention between the mentees and mentors

Appendix 1 shows the comparison of the pre and post-intervention SVS parameters between the mentees and mentors. For SVS, no significant differences were noted between the groups pre- or post-intervention. The pre-intervention scores were 28.86 for mentees and 26.5 for mentors ($p=0.618$), while post-intervention scores were 29.43 for mentees and 28.67 for mentors ($p=0.841$).

University Student Engagement Inventory (USEI) improvement after intervention between the mentees and controls

Table 5 shows the comparison of the pre-intervention USEI parameters between the mentees and controls, while Table 6 shows the comparison of the pre-intervention USEI parameters between the mentees and controls. Pre-intervention USEI scores were significantly lower in the mentee group (mean 57.0, IQR 50.5–61.5) compared to the control group (mean 64.0, IQR 62.0–64.0) ($p=0.006$). Following the intervention, the mentee group showed a slight increase in USEI scores (mean 57.86 ± 8.8), while the control group experienced a slight decrease (mean 55.5 ± 5.81); however, these changes were not statistically significant ($p=0.388$).

University Student Engagement Inventory (USEI) improvement after intervention between the mentees and mentors

Appendix 2 shows the comparison of the pre-intervention and post-intervention USEI parameters between the mentees and mentors. In terms of USEI scores, no significant differences were found between mentees and mentors pre- or post-intervention. Pre-intervention, mentees had a score of 55.86, and mentors scored 59.75 ($p=0.122$). Post-intervention scores showed mentees at 57.86 and mentors at 56.5 ($p=0.686$).

Specific USEI and SVS items between the mentees and controls

Pre-intervention analysis of specific USEI items revealed that mentees scored significantly lower in items related to classroom participation and engagement, such as “When I have doubts, I ask questions and participate in debates in the classroom” (mentee mean 2.71 ± 1.11 vs. control mean 3.93 ± 0.69; $p=0.001$) and “When I read a book, I question myself to make sure I understand the subject I’m reading about” (mentee median 4.0, IQR 3.0–4.0 vs. control median 5.0, IQR 4.25–5.0; $p=0.003$). Post-intervention, the mentee group showed significant improvement in “I like being at school” (mentee mean 4.43 ± 0.79 vs. control mean 3.57 ± 0.94; $p=0.031$) and “I talk to people outside the school about matters that I learned in class” (mentee mean 4.14 ± 1.21 vs. control mean 3.13 ± 1.01; $p=0.028$). Additionally, the mentee group reported higher scores in “If I do not understand the meaning of a word, I try to solve the problem, for example, by consulting a dictionary or asking someone else” (mentee mean 4.86 ± 0.38 vs. control mean 4.33 ± 0.8; $p=0.018$). In contrast, SVS items showed no significant changes post-intervention, with both groups maintaining relatively stable scores. The mentee group showed slight improvements in feeling “alert and awake” and “energised,” but these changes were not statistically significant.

Specific USEI and SVS items between the mentees and mentors

In the pre-intervention analysis, mentors demonstrated significantly higher scores than mentees for several items. For example, mentors scored significantly higher in paying attention in class (4.83 vs. 4.14, $p=0.012$) and following the school’s rules (4.92 vs. 4.43, $p=0.018$). Other parameters did not show significant differences between groups, such as completing homework on time (3.83 vs. 3.71, $p=0.806$). Post-intervention USEI analysis revealed no significant differences for most items, except for the

Table 5 Comparison of the pre-intervention USEI parameters between the mentees and controls

Statement	Total	Mentee	Control	p-value
I pay attention in class	4.57 ± 0.65	4.14 ± 0.69	4.67 ± 0.61	0.052
I follow the school's rules	4.81 ± 0.4	4.43 ± 0.53	4.9 ± 0.31	0.06
I usually do my homework on time	4.11 ± 0.88	3.71 ± 1.38	4.2 ± 0.71	0.19
When I have doubts, I ask questions and participate in debates in the classroom	3.7 ± 0.91	2.71 ± 1.11	3.93 ± 0.69	0.001**
I usually participate actively in group assignments	4.51 ± 0.77	4.29 ± 0.76	4.57 ± 0.77	0.391
I don't feel very accomplished at this school	2.24 ± 0.95	2.57 ± 1.72	2.16 ± 0.69	0.558
I feel excited about the schoolwork	3.84 ± 1.09	3.29 ± 1.38	3.97 ± 1.0	0.14
I like being at school	4.08 ± 0.89	3.57 ± 1.51	4.2 ± 0.66	0.094
I am interested in the school work	4.38 ± 0.92	4.14 ± 1.21	4.43 ± 0.86	0.461
My classroom is an interesting place to be	3.62 ± 1.11	3.0 ± 1.91	3.77 ± 0.82	0.336
When I read a book, I question myself to make sure I understand the subject I'm reading about	5.0 (4.0–5.0)	4.0 (3.0–4.0)	5.0 (4.25–5.0)	0.003**
I talk to people outside the school about matters that I learned in class	3.97 ± 0.99	4.0 ± 1.15	3.97 ± 0.96	0.937
If I do not understand the meaning of a word, I try to solve the problem for example by consulting a dictionary or asking someone else	4.92 ± 0.28	4.71 ± 0.49	4.97 ± 0.18	0.224
I try to integrate the acquired knowledge in solving new problems	4.22 ± 0.85	3.86 ± 1.46	4.3 ± 0.65	0.222
I try to integrate subjects from different disciplines into my general knowledge	4.11 ± 0.81	3.86 ± 1.35	4.17 ± 0.65	0.369

item “I like being at school,” where mentees scored significantly higher than mentors (4.43 vs. 3.58, $p=0.038$). Other items, such as paying attention in class and following the rules, showed reduced but non-significant differences between the two groups.

In the pre-intervention SVS assessment, there were no statistically significant differences between mentees and mentors for any of the parameters. For instance, the item

“At this moment I feel alive and vital” showed mentees scoring 3.29 and mentors 3.67 ($p=0.694$). Post-intervention analysis also showed no significant differences between the groups. For example, “At this moment I feel alive and vital” had mentees scoring 4.29 and mentors 5.0 ($p=0.381$). Likewise, “I don't feel very energetic right now” did not show significant differences ($p=0.934$).

Table 6 Comparison of the post-intervention USEI parameters between the mentees and controls

Statement	Total	Mentee	Control	p-Value
I pay attention in class	4.03 ± 0.76	3.86 ± 0.9	4.07 ± 0.74	0.521
I follow the school's rules	4.38 ± 0.76	4.43 ± 0.53	4.37 ± 0.81	0.849
I usually do my homework on time	3.78 ± 1.03	3.43 ± 1.13	3.87 ± 1.01	0.318
When I have doubts, I ask questions and participate in debates in the classroom	3.16 ± 1.17	3.57 ± 1.51	3.07 ± 1.08	0.309
I usually participate actively in group assignments	4.0 ± 1.03	4.0 ± 1.53	4.0 ± 0.91	1.0
I don't feel very accomplished at this school	2.62 ± 1.09	2.43 ± 1.13	2.67 ± 1.09	0.609
I feel excited about the schoolwork	3.46 ± 0.99	3.86 ± 1.21	3.37 ± 0.93	0.243
I like being at school	3.73 ± 0.96	4.43 ± 0.79	3.57 ± 0.94	0.031**
I am interested in the school work	3.84 ± 0.93	4.29 ± 0.76	3.73 ± 0.94	0.159
My classroom is an interesting place to be	3.11 ± 0.94	3.14 ± 1.57	3.1 ± 0.76	0.946
When I read a book, I question myself to make sure I understand the subject I'm reading about	4.14 ± 0.89	4.43 ± 0.98	4.07 ± 0.87	0.338
I talk to people outside the school about matters that I learned in class	3.32 ± 1.11	4.14 ± 1.21	3.13 ± 1.01	0.028**
If I do not understand the meaning of a word, I try to solve the problem for example by consulting a dictionary or asking someone else	4.43 ± 0.77	4.86 ± 0.38	4.33 ± 0.8	0.018**
I try to integrate the acquired knowledge in solving new problems	4.08 ± 0.92	3.86 ± 1.57	4.13 ± 0.73	0.484
I try to integrate subjects from different disciplines into my general knowledge	3.86 ± 1.13	3.14 ± 1.46	4.03 ± 1.0	0.06

Discussion

The motivation for this study stems from the growing number of medical students facing academic challenges, which frequently results in elevated stress levels and burnout [21, 22]. The principal findings of the study were that the intra-class (same class) peer mentorship programme significantly improved academic performance, as evidenced by the increase in CAT scores, and enhanced subjective vitality, and increased student engagement. Though mentee's improvement on subjective vitality and school engagement were not significantly better than those in the control group certain USEI items related to classroom participation and engagement exhibited significant post-intervention improvements in the mentee group when compared to controls.

The current study revealed a significant improvement in CAT scores among mentees, in contrast to a slight decline in the control group's scores. These findings are consistent with previous research indicating that peer-mentorship programmes can positively impact academic performance, particularly among students facing academic challenges. For example, a controlled study by Sedigh et al. in Iran similarly found that the intervention significantly enhanced academic progress in the intervention group compared to the control group [9]. Yoon and Ju's study also reported similar findings, showing that peer mentorship programmes increased students' confidence in basic skills and critical thinking [23]. According to Arkan et al., clinical educators play a crucial role in reducing stress, creating a supportive environment, and fostering students' self-confidence in clinical settings [24]. The use of same-class-level peers as mentors appears to have been an important factor in boosting self-confidence, reducing stress, and enhancing clinical experiences, leading to improved academic performance [24]. The significant improvement in CAT scores among mentees suggests that peer mentorship is an effective strategy for enhancing academic performance in academically underperforming students [25–27].

Regarding our findings on school engagement, a number of studies have highlighted the benefits of peer support in enhancing student engagement and reducing the stress associated with academic challenges [19, 20]. While the mentee group showed slight improvements in the SVS and USEI scores, these changes were not statistically significant. This finding is consistent with a systematic review by John et al., which found no evidence that peer support improves mental well-being among university students [28]. However, the lack of significant changes in SVS and overall USEI scores contrasts with findings from studies in high-income settings, where

mentorship has been shown to have broader effects on student well-being and engagement [29, 30]. The lack of significant changes in SVS and USEI scores in this study could be due to the short duration of the intervention or cultural differences in how students engage with peer-mentorship programmes.

Nonetheless, specific USEI items related to classroom participation and engagement showed significant post-intervention improvements in the mentee group. These improvements may suggest that the intervention helped mentees develop better academic habits and a more positive attitude toward learning. This study contributes to the growing body of evidence supporting peer mentorship as a valuable tool for improving academic outcomes in medical education. It provides novel insights into specific areas of academic engagement that can be positively influenced by mentorship, such as classroom participation and proactive learning behaviours. The findings also underscore the need for further research into the factors that influence the effectiveness of peer mentorship in different cultural and educational contexts.

The significant improvement in academic performance among mentees suggests that same-class peer mentorship could be integrated into medical curricula as a cost-effective intervention for supporting academically underperforming students. As revealed in a previous Nigerian study on failure rates in examinations, a dropout rate of 41.42% for males and 38.94% for females were observed [2]. To the best of the authors' knowledge, no study has assessed the impact of a same-class level peer mentorship intervention on academic performance, physical and mental energy, and engagement among academically underperforming medical students in low- and middle-income countries. This study addressed this gap by examining the effects of such an intervention on these outcomes among academically underperforming medical students in Nigeria. This study adds to the limited literature on same-class peer-mentorship interventions in low-resource settings, particularly in Nigeria. The findings are relevant to educational institutions in similar contexts, where resource constraints often limit access to traditional academic support services. The study's focus on academically underperforming medical students, a group at high risk for academic failure, highlights the potential of peer mentorship to address educational disparities. These findings could have significant implications for medical education in resource-limited settings, providing a cost-effective and sustainable model for supporting at-risk students. Future research should explore the long-term effects of same-class peer mentorship on academic outcomes and well-being and the mechanisms

underlying its effectiveness. Additionally, studies should examine how to optimise the structure and content of same-class mentorship programmes to maximise their impact.

The study’s strengths include its focus on a vulnerable student population and the use of validated instruments (SVS, and USEI) to measure outcomes. Additionally, our research approach differs from other studies by including same-class level mentors, which has yet to be investigated. However, the mentors, being high-performing students, may have varying levels of teaching or mentoring skills. Differences in the effectiveness of individual mentors could introduce variability in the outcomes observed among the mentees. Also, the small sample size, particularly in the mentee group, may limit the generalisability of the findings. Small sample size may have limited our ability in adequately capturing variety of experiences and cultural elements that may be present in the general population. Consequently, our conclusion may be biased because only a small proportion of the mentees’ experiences may have been captured. Besides, the small sample size may lower the statistical power of the analysis, raising the possibility of type II errors, and limiting the study’s ability to identify subtle but significant variations or trends. The short duration of the study may also have limited the ability to detect changes in SVS and overall USEI scores. This might have arisen given that the students may need more time to adapt to the intervention as well as internalise the learning strategies, emotional and psychological prompts in the peer mentoring programme. Future studies with larger sample sizes and longer follow-up periods are needed to validate these findings.

Conclusion

This study demonstrates that the same-class peer mentorship intervention significantly improves academic performance among academically underperforming medical students, as shown by the notable increase in CAT scores. Although the improvements in subjective vitality and student engagement were modest and not statistically significant, specific enhancements in classroom engagement were observed. The intra-class intervention shows promise as a practical approach to supporting medical students facing academic challenges, particularly in resource-limited settings. However, due to the small sample size and short study duration, these findings should be interpreted with caution. Further research is essential to establish the precise benefits of the intervention.

Appendix 1

Table 7 Comparison of the pre and post-intervention SVS parameters between the mentees and mentors

Statement	Total	Mentee	Mentor	p-Value
PRE SVS				
At this moment I feel alive and vital	3.53 ± 1.95	3.29 ± 2.14	3.67 ± 1.92	0.694
I don’t feel very energetic right now	3.42 ± 1.8	3.86 ± 1.95	3.17 ± 1.75	0.437
Currently I feel so alive I just want to burst	2.42 ± 1.22	2.57 ± 1.51	2.33 ± 1.07	0.693
At this time I have energy and spirit	4.16 ± 1.77	4.0 ± 1.63	4.25 ± 1.91	0.776
I am looking forward to each new day	5.32 ± 2.08	5.71 ± 2.14	5.08 ± 2.11	0.54
At this moment I feel alert and awake	4.47 ± 2.06	4.86 ± 2.12	4.25 ± 2.09	0.552
I feel energized right now	4.05 ± 2.25	4.57 ± 2.57	3.75 ± 2.09	0.458
POST SVS				
At this moment I feel alive and vital	4.74 ± 1.66	4.29 ± 1.25	5.0 ± 1.86	0.381
I don’t feel very energetic right now	2.11 ± 1.45	2.14 ± 1.46	2.08 ± 1.51	0.934
Currently I feel so alive I just want to burst	2.63 ± 1.57	3.0 ± 2.08	2.42 ± 1.24	0.451
At this time I have energy and spirit	4.53 ± 1.5	4.71 ± 1.11	4.42 ± 1.73	0.69
I am looking forward to each new day	5.26 ± 1.63	5.43 ± 1.81	5.17 ± 1.59	0.746
At this moment I feel alert and awake	5.05 ± 1.78	5.43 ± 1.9	4.83 ± 1.75	0.497
I feel energized right now	4.63 ± 1.74	4.43 ± 2.07	4.75 ± 1.6	0.709

Appendix 2

Table 8 Comparison of the pre-intervention and post-intervention USEI parameters between the mentees and mentors

Statement	Total	Mentee	Mentor	p-Value
PRE USEI				
I pay attention in class	4.58 ± 0.61	4.14 ± 0.69	4.83 ± 0.39	0.012**
I follow the school’s rules	4.74 ± 0.45	4.43 ± 0.53	4.92 ± 0.29	0.018**
I usually do my homework on time	3.79 ± 0.98	3.71 ± 1.38	3.83 ± 0.72	0.806
When I have doubts I ask questions and participate in debates in the classroom	3.32 ± 1.11	2.71 ± 1.11	3.67 ± 0.98	0.069
I usually participate actively in group assignments	4.37 ± 0.6	4.29 ± 0.76	4.42 ± 0.51	0.658

Statement	Total	Mentee	Mentor	p-Value
I don't feel very accomplished at this school	2.53 ± 1.39	2.57 ± 1.72	2.5 ± 1.24	0.918
I feel excited about the schoolwork	3.63 ± 1.21	3.29 ± 1.38	3.83 ± 1.11	0.357
I like being at school	3.68 ± 1.06	3.57 ± 1.51	3.75 ± 0.75	0.733
I am interested in the school work	4.21 ± 1.03	4.14 ± 1.21	4.25 ± 0.97	0.834
My classroom is an interesting place to be	3.37 ± 1.26	3.0 ± 1.91	3.58 ± 0.67	0.462
When I read a book I question myself to make sure I understand the subject I'm reading about	4.05 ± 0.85	3.57 ± 0.98	4.33 ± 0.65	0.056
I talk to people outside the school about matters that I learned in class	3.53 ± 1.02	4.0 ± 1.15	3.25 ± 0.87	0.125
If I do not understand the meaning of a word I try to solve the problem for example by consulting a dictionary or asking someone else	4.63 ± 0.5	4.71 ± 0.49	4.58 ± 0.51	0.593
I try to integrate the acquired knowledge in solving new problems	3.95 ± 0.97	3.86 ± 1.46	4.0 ± 0.6	0.767
I try to integrate subjects from different disciplines into my general knowledge	3.95 ± 0.91	3.86 ± 1.35	4.0 ± 0.6	0.752
POST USEI				
I pay attention in class	4.21 ± 0.71	3.86 ± 0.9	4.42 ± 0.51	0.100
I follow the school's rules	4.47 ± 0.51	4.43 ± 0.53	4.5 ± 0.52	0.779
I usually do my homework on time	3.68 ± 1.11	3.43 ± 1.13	3.83 ± 1.11	0.458
When I have doubts I ask questions and participate in debates in the classroom	3.63 ± 1.16	3.57 ± 1.51	3.67 ± 0.98	0.869
I usually participate actively in group assignments	4.16 ± 1.07	4.0 ± 1.53	4.25 ± 0.75	0.636
I don't feel very accomplished at this school	2.42 ± 0.96	2.43 ± 1.13	2.42 ± 0.9	0.98
I feel excited about the schoolwork	3.47 ± 0.96	3.86 ± 1.21	3.25 ± 0.75	0.193
I like being at school	3.89 ± 0.88	4.43 ± 0.79	3.58 ± 0.79	0.038**
I am interested in the school work	3.89 ± 0.88	4.29 ± 0.76	3.67 ± 0.89	0.141
My classroom is an interesting place to be	3.21 ± 1.08	3.14 ± 1.57	3.25 ± 0.75	0.87
When I read a book I question myself to make sure I understand the subject I'm reading about	4.26 ± 0.81	4.43 ± 0.98	4.17 ± 0.72	0.51

Statement	Total	Mentee	Mentor	p-Value
I talk to people outside the school about matters that I learned in class	3.53 ± 1.17	4.14 ± 1.21	3.17 ± 1.03	0.079
If I do not understand the meaning of a word I try to solve the problem for example by consulting a dictionary or asking someone else	4.58 ± 0.51	4.86 ± 0.38	4.42 ± 0.51	0.066
I try to integrate the acquired knowledge in solving new problems	3.95 ± 1.08	3.86 ± 1.57	4.0 ± 0.74	0.79
I try to integrate subjects from different disciplines into my general knowledge	3.63 ± 1.21	3.14 ± 1.46	3.92 ± 1.0	0.187

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Authors' contributions

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Data availability

Data is provided within the manuscript or supplementary information files.

Declarations

Ethics approval and consent to participate

An ethical approval was obtained from Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria Research Ethics Committee with approval number NAUTH/CS/66/VOL.15/VER.3/337/2023/93. In addition, permission was obtained from the authorities of the tertiary institution. An informed consent was obtained from each study participants before the involvement in the study. The collected data were kept confidential and accessed only by the research team member. Trial registration: Pan African Clinical Trial registry, PACTR202405546896613.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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