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Assessing the Role of Self-Compassion in Dental Environment Stress and Academic Performance Among Dental Students: A Mixed-Methods Study

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Title: Assessing the Role of Self-Compassion in Dental Environment Stress and Academic Performance Among Dental Students: A Mixed-Methods Study

Background: Dental education exposes students to academic and clinical stress, potentially affecting their confidence and learning. Self-compassion, may serve as a learner-related resource, but its relationship with dental environment stress and academic performance remains under-explored.

Methods: The study examined the association of self-compassion with dental environment stress and academic performance and explored dental students' experiences of self-compassion while coping with academic and clinical stress. An explanatory sequential mixed-methods design was used. The quantitative phase included 203 second, third, and fourth-year students from Islamic International Dental College. Self-compassion was measured using the 26-item Self-Compassion Scale, and stress using the modified 34-item Dental Environment Stress questionnaire. Academic performance was assessed through the most recent Combined Block Assessment scores. Descriptive statistics, Pearson correlations, and multiple regression were conducted using SPSS. In the qualitative phase, 18 students purposively selected from low, intermediate, and high self-compassion groups participated in three focus group discussions. Data were analysed using reflexive thematic analysis.

Results: Self-compassion showed a weak but statistically significant negative correlation with dental environment stress ($r = -0.247$, $p < .001$). After adjustment for age, gender and year of study, higher self-compassion remained associated with lower stress ($B = -0.961$, $\beta = -0.248$, $p < .001$). Adding self-compassion increased explained variance by 6.1% ($\Delta R^2 = .061$); the final model explained 9.7% ($R^2 = .097$). Neither self-compassion nor dental environment stress was significantly associated with theory or practical scores.

Qualitative findings showed that students with higher self-compassion more often used balanced self-talk, regulated emotions, and recovered better from setbacks. While intermediate group showed varied response,

lower self-compassion described emotional overwhelm, reduced confidence, and excessive self-criticism. Clear expectations, constructive feedback, mentoring, and psychological safety also shaped coping and learning.

Discussion: Although the academic score findings were non significant, students' accounts suggest that self-compassion may support engagement with feedback, emotional regulation, help-seeking, and clinical confidence.

Conclusion: Self-compassion showed a weak but statistically significant association with lower dental environment stress but was not significantly associated with academic scores. These findings may inform learner-support and faculty-development strategies promoting reflective learning and adaptive responses to the demands of dental education.

Keywords*:* *Self-compassion; dental environment stress; academic performance; dental students; dental education; mixed-methods study.*

Background

Dental education requires students to develop theoretical knowledge, clinical skills, and professional judgement while managing examinations, patient care, and continuous assessment [1]. These demands can make the learning environment stressful. In a study involving 14 dental schools, workload was a prominent source of dental environment stress, although reported stress varied across settings [2]. Understanding students' responses to these pressures may help educators support learning as well as well-being.

Self-compassion refers to responding to difficulty with self-kindness, acknowledging shared human experience, and mindful awareness, rather than harsh self-criticism, isolation, or over-identification with distress [3, 4]. These responses may be relevant when dental students face clinical errors, critical feedback,

or disappointing assessment results. Among medical students, self-compassion was associated with a smaller gap between students' image of an ideal doctor and their view of themselves [5]. Among Japanese dental hygiene students, higher self-compassion was associated with less uneasiness about their professional future [6]. These studies point to its possible relevance for professional learning, although study populations and outcomes are different in these mentioned studies.

Research involving medical and dental students has also examined self-compassion in relation to perfectionism and burnout. Pereira et al. [7] reported a mediating role for self-compassion in this relationship. In a prospective study, Cabaços et al. [8] found that perfectionism predicted burnout both directly and indirectly through self-compassion and repetitive negative thinking. Neither study directly addressed the combined relationships of self-compassion with dental environment stress and recorded theory and practical assessment scores in a dental student sample.

A mixed-methods study in Pakistan examined academic stress, educational environment, and assessment results among medical and dental students [9], but did not assess self-compassion. Guided by Neff's model, the present study therefore examined the associations of self-compassion with dental environment stress and academic scores among undergraduate dental students [3]. An explanatory sequential mixed-methods design was used to explore students' experiences of stress, mistakes, and feedback alongside the quantitative findings.

Methods

Study design and setting

We conducted an explanatory sequential mixed-methods study at Islamic International Dental College, RIU, Pakistan, from March to August 2026. The first phase examined associations among self-compassion, dental environment stress, and academic performance. The subsequent qualitative phase explored students'

lived experiences to help explain the quantitative findings. Neff's model informed the measurement of self-compassion and the focus group discussion (FGD) guide [3].

Participants and sample size

All second, third, and fourth year Bachelor of Dental Surgery (BDS) students were invited to participate in the quantitative phase (75 in each class). First-year students were excluded because the study focused on experiences gained through greater exposure to the dental learning environment. Students were included in the analysis if they consented, completed both questionnaires, and had accessible academic performance records. Incomplete responses and responses from pilot participants were excluded.

Of the 225 students enrolled in the second, third, and final year BDS classes, five pilot participants were excluded before recruitment. All remaining 220 eligible students were invited to participate through an attempted census approach. Of these, 203 voluntarily completed the questionnaires and were included in the final quantitative analysis, representing a response rate of 92.3%.

For the qualitative phase, 18 participants were purposively selected from the quantitative sample. Self-compassion scores guided selection for three FGDs of six students each: low (at or below the 20th percentile), intermediate (above the 20th and below the 80th percentile), and high (at or above the 80th percentile). Grouping students with similar scores was intended to encourage open discussion and minimise peer-related social desirability bias. These categories were not used for statistical comparisons, and were not disclosed to students as labels during discussion.

Measures and pilot testing

Self-compassion was measured using the 26-item Self-Compassion Scale (SCS) [3]. Items were rated from 1 (almost never) to 5 (almost always). Items assessing self-judgement, isolation, and over-identification

were reverse-scored before calculating the overall score. The overall score was calculated by summing all 26 item scores, yielding a possible range of 26–130. Higher scores indicated greater self-compassion.

Dental environment stress was measured using the 34-item modified Dental Environment Stress (DES) questionnaire used by Murphy et al. [10], based on the instrument developed by Garbee et al. [11]. It assesses stressors related to academic and clinical demands, faculty, patients, performance, and personal circumstances. Items were rated from 1 (not stressful) to 4 (very stressful). The overall score was calculated by summing all 34 item scores, yielding a possible range of 34–136. Higher scores indicated greater perceived stress.

Before the main study, both questionnaires were piloted with 20 BDS students, mostly from first year. The pilot assessed clarity and questionnaire completion. Cronbach's alpha was 0.737 for the SCS and 0.80 for the DES.

For the academic scores/performance, all the three class students' most recent combined block assessment (CBA) scores were taken from institutional records. Institutional scores on a 40% scale were re-scaled to percentages out of 100 by multiplying by 2.5. Theory and practical percentages were analysed separately in the correlation analyses, while the combined theory and practical CBA percentage was used in the academic performance regression.

Quantitative data collection

Eligible students were approached during the final 15 minutes of scheduled classes and informed about the study. Links to the questionnaires were then shared through class WhatsApp groups, with reminders over the following two days. Students were asked to complete the forms individually and were told that participation and responses would not affect their academic evaluation.

Student identifiers entered in the forms enabled questionnaire responses to be matched with CBA records. Responses were checked for completeness before analysis.

Focus groups and qualitative analysis

The semi-structured FGD guide was developed from Neff's self-compassion model, and literature on dental environment stress, following guidance for developing semi-structured questions [12]. It covered academic and clinical stress, self-talk after mistakes, responses to feedback, coping, help-seeking, and perceived effects on learning and confidence. It was reviewed by a medical educationist for clarity and relevance with the study objectives. The final guide is provided in Additional file 1.

The three FGDs took place on separate days in a quiet room, each lasting approximately 50–60 minutes. Participants gave written consent for participation and audio recording. The moderator had previously taught the participants and was familiar with them. Before each discussion, confidentiality was explained and a supportive atmosphere was established to encourage participants to speak openly. The moderator used the guide flexibly and invited all students to contribute; a second researcher took notes. The audio recordings were transcribed for analysis and de-identified. Urdu and mixed Urdu–English responses were translated into English while preserving their intended meaning.

Data were analysed using Braun and Clarke's reflexive thematic analysis approach [13]. A combined deductive–inductive approach was used, with coding primarily informed by Neff's self-compassion model while remaining open to meanings and experiences expressed by students other than the model. Three educators undertook initial coding and discussed their interpretations in joint meetings. Themes were developed through repeated engagement with transcripts, coded extracts, and field notes. Reporting of the qualitative component was checked against the COREQ checklist [14], provided in Additional file 2. Examples of initial coding, code refinement, and category and theme development are provided in Additional file 3.

Statistical analysis and integration

Quantitative data were analysed using IBM SPSS Statistics, version 26. Continuous measures were summarised using means and standard deviations, and participant characteristics were reported as counts and percentages. Distributions were assessed using Shapiro–Wilk tests, histograms, Q–Q plots, and skewness and kurtosis values. Although Shapiro–Wilk tests indicated departures from normality, visual inspection, skewness and kurtosis values supported treating the study variables as approximately normally distributed. Pearson correlations examined associations among self-compassion, DES, and CBA theory and practical scores, analysed separately.

Hierarchical multiple linear regression was conducted for two outcomes: DES score and combined CBA percentage score. For both outcomes, age, gender, and year of study were entered in Model 1. For DES, self-compassion was added in Model 2. For combined CBA scores, self-compassion and DES were added together in Model 2. Gender was coded 1 = male and 2 = female. Year of study was entered as a numeric predictor (2 = second year, 3 = third year, 4 = fourth year), assuming a constant change in the outcome for each one-year increase. Regression coefficients, overall model fit, and changes in explained variance were assessed. Statistical significance was set at $p < 0.05$.

For both regression models, potential outliers and influential observations were assessed using standardized residuals, leverage values, Cook's distance, and Mahalanobis distance. Linearity, independence of errors, homoscedasticity, and multicollinearity were also evaluated.

Quantitative findings informed purposive selection for the qualitative phase. After the quantitative and qualitative analyses were completed separately, findings were compared in a joint display. Statistical associations were considered alongside students' accounts from the low, intermediate, and high self-compassion FGDs, including their experiences of coping, learning, and confidence in relation to the academic score findings.

Ethics

Ethical approval was obtained from the Ethics Review Committee of Islamic International Dental College, Riphah International University,reference number (Riphah/IRB/26/1011), date:(23-02-2026). The study was conducted in accordance with the Declaration of Helsinki. The Google Forms questionnaire provided information about the study purpose, voluntary participation, confidentiality, and the right to decline questions or withdraw without consequences. Participants indicated informed consent by proceeding with the form. Written informed consent was obtained separately before FGD participation and audio recording. Recordings and identifiable data were stored securely, with access limited to the research team.

Results

Participant characteristics and study measures

Complete quantitative data were available for 203 second, third, and fourth year BDS students. Of these, 154 (76%) were female and 49 (24%) were male. Mean age was 21.31 years (SD = 1.30). Most participants lived with their families (178, 88%) and were single (200, 99%).

The mean self-compassion score was 75.98 (SD = 4.04), and the mean DES score was 86.02 (SD = 15.67). Mean CBA scores were 64.21% (SD = 7.69) for theory and 59.44% (SD = 7.49) for practical assessment.

Associations among self compassion, DES and academic scores

Higher self-compassion was weakly associated with lower DES scores ($r = -0.247$, $p < 0.001$; Table 1). Neither self-compassion nor DES was significantly associated with CBA theory or practical scores.

Table 1. Pearson correlations among self-compassion, DES, and academic scores (N = 203)

Association	r	p
Self-compassion and DES	−0.247	< 0.001

Association	r	p
Self-compassion and CBA theory	−0.120	0.089
Self-compassion and CBA practical	−0.003	0.963
DES and CBA theory	−0.041	0.560
DES and CBA practical	−0.075	0.289

Note. DES = dental environment stress; CBA = Combined Block Assessment. Theory and practical percentage scores were analysed separately.

Hierarchical multiple regression predicting dental environment stress

The model including age, gender, and year of study was not statistically significant (Model 1: $p = 0.062$). Adding self-compassion increased the explained variance by 6.1 percentage points. The final model was statistically significant, $F(4, 198) = 5.319$, $p < 0.001$, and explained 9.7% of the variance in DES scores (Table 2).

After adjustment for age, gender, and year of study, higher self-compassion was associated with lower DES scores ($B = −0.961$, $\beta = −0.248$, $p < 0.001$). Age and year of study were also significantly associated with DES scores in the final model; gender was not.

Table 2. Hierarchical multiple regression predicting dental environment stress (N = 203)

	Model 1				Model 2			
Predictor	B	SE	β	p	B	SE	β	p
Constant	113.923	22.023	—	< 0.001	192.491	30.311	—	< 0.001
Age	−2.224	1.187	−0.185	0.062	−2.463	1.153	−0.205	0.034
Gender	2.981	2.547	0.082	0.243	2.644	2.473	0.072	0.286
Year of study	4.789	1.895	0.250	0.012	4.830	1.839	0.252	0.009
Self-compassion	—	—	—	—	−0.961	0.263	−0.248	< 0.001

Model fit

Statistic	Model 1	Model 2
R^2	0.036	0.097
Adjusted R^2	0.022	0.079

Statistic	Model 1	Model 2
Overall F (df)	2.485 (3, 199)	5.319 (4, 198)
Overall model p	0.062	< 0.001
ΔR^2 after adding self-compassion	—	0.061

Note. The outcome was DES score. Model 1 included age, gender, and year of study; Model 2 added self-compassion. Year of study was entered numerically (2 = second year, 3 = third year, 4 = fourth year); B represents the modelled difference for each one-year increase. Gender was coded 1 = male and 2 = female; B represents the modelled difference for females relative to males. These coefficients hold other predictors constant. B = unstandardized coefficient; SE = standard error; β = standardized coefficient; ΔR^2 = change in explained variance.

Hierarchical multiple regression predicting combined CBA scores

The final model explained 5.1% of the variance in combined CBA scores but was not statistically significant, $F(5, 197) = 2.101$, $p = 0.067$. Adding self-compassion and DES did not significantly improve model fit ($\Delta R^2 = 0.018$, $\Delta F(2, 197) = 1.845$, $p = 0.161$). Neither self-compassion nor DES was significantly associated with combined CBA scores after adjustment for age, gender, and year of study (Table 3). Although the overall model was not significant, the individual coefficients for age and year of study were statistically significant.

Table 3. Hierarchical multiple regression predicting combined CBA scores (N = 203)

Predictor	Model 1 B	SE	β	p	Model 2 B	SE	β	p
Constant	77.964	9.856	—	< 0.001	98.684	15.273	—	< 0.001
Age	−1.105	0.531	−0.206	0.039	−1.264	0.536	−0.235	0.019
Gender	0.645	1.140	0.040	0.572	0.735	1.139	0.045	0.520
Year of study	2.149	0.848	0.251	0.012	2.404	0.859	0.280	0.006
Self-compassion	—	—	—	—	−0.182	0.125	−0.105	0.147
DES	—	—	—	—	−0.052	0.033	−0.115	0.116

Model fit

Statistic	Model 1	Model 2
R^2	0.033	0.051

Statistic	Model 1	Model 2
Adjusted R^2	0.018	0.027
Overall F (df)	2.253 (3, 199)	2.101 (5, 197)
Overall model p	0.083	0.067
ΔR^2 after adding self-compassion and DES	—	0.018
ΔF (df)	—	1.845 (2, 197)
p for change in model fit	—	0.161

Note. The outcome was the combined CBA percentage score, calculated as described in Methods. Model 1 included age, gender, and year of study; Model 2 added self-compassion and DES. Coding and coefficient definitions are as described in Table 2. CBA = Combined Block Assessment; DES = dental environment stress; ΔF = change in F after adding the second block of predictors.

Regression diagnostics indicated that the evaluated assumptions were adequately met, and no observations were identified as having undue influence on the regression estimates.

Qualitative findings

Eighteen students participated in three focus group discussions (FGDs), with six participants in each of the higher, intermediate, and lower-self-compassion groups. Each group included students from second, third, and fourth year. Analysis across the three groups generated four themes (Table 4). Supporting coded extracts, quotations across self-compassion groups, and analytical memos are provided in Additional file 3.

Table 4. Qualitative themes, Sub themes, and illustrative quotations

Theme	Sub themes	Illustrative quotation
Navigating the demands of dental education	Academic and clinical sources of stress	"There is academic pressure and clinical quotas, especially when professional examinations are taking place while we are completing clinical work." (Intermediate group, P1)
Self-compassion as a resource for responding to academic and clinical challenges	Internal dialogue and self-perception following mistakes, criticism, and setbacks	"I analyze myself and think about what went wrong and how I can improve. I keep trying." (Higher self-compassion group, P1)
Managing stress to sustain academic, clinical, and professional functioning	Coping and recovery strategies; perceived influence of stress responses on functioning	"I do regular meditation, and it has helped me a lot… I say, 'What worse can happen?'… then I become a bit calm." (Higher self-compassion group, P2)
Institutional learning environment and its influence on student well-being and learning	Institutional learning environment and support needs	"Sometimes the faculty environment feels hostile… Faculty may pinpoint mistakes or hold grudges… Only a few people facilitate and actually support students." (Lower self-compassion group, P3)

Note. Participant numbers P1–P6 apply within each FGD; the same number in different groups does not identify the same student.

Navigating the demands of dental education. Students across all three groups described pressure from examinations, workload, clinical requirements, patient care, and faculty expectations. Their descriptions of these pressures varied. Students in the higher-self-compassion group generally acknowledged stress while describing it as manageable. Intermediate-group students emphasized unclear expectations and inconsistent guidance. Lower-self-compassion students more often described clinical stress in emotionally intense terms, including fear after a perceived mistake in patient care.

Responding to academic and clinical challenges. Higher-self-compassion students described reflection, constructive self-talk, and adjusting their approach after setbacks. As one student explained, "I change my study method or my strategy and check if it works" (higher-self-compassion group, P2). Intermediate-group students described a mixture of acceptance and self-doubt. Lower-self-compassion students more often described overthinking, self-criticism, and reluctance to seek help after criticism: "If teachers snub or criticize me, I do not feel like asking again or moving forward" (lower-self-compassion group, P3).

Managing stress and continuing to function. Students described using rest, exercise, family and peer support, reflection, and hobbies to manage stress. Higher-self-compassion students more often described strategies that helped them recover and return to academic work. Intermediate-group accounts were more variable. Some lower-self-compassion students described temporary escape from stress alongside continuing difficulties with motivation or confidence. These are descriptions of students' experiences; the FGDs did not establish differences in assessment performance between the groups.

The institutional learning environment. Students in all groups called for clearer expectations, consistent clinical supervision, supportive feedback, and mentoring. Intermediate-group students particularly noted conflicting guidance from supervisors. Lower-self-compassion students described criticism after mistakes

and difficulty asking for help. One student said, “We have to rely on ourselves because no one teaches us properly in clinics. Then, when we make mistakes, we are criticized” (lower-self-compassion group, P5). The accounts show that students understood their responses to stress in the context of their learning environment.

Integration of quantitative and qualitative findings

The joint display brings the statistical findings together with students’ accounts (Table 5). The FGDs provided context for the negative association between self-compassion and DES: students with higher self-compassion described more balanced responses to setbacks, while those with lower self-compassion more often described self-criticism and difficulty recovering from criticism. Students also described effects on confidence, concentration, and engagement that were not reflected in statistically significant associations with CBA scores.

Table 5. Joint display of quantitative and qualitative findings

Quantitative finding	Qualitative evidence	Integrated interpretation
Self-compassion was weakly and negatively associated with DES ($r = -.247$, $p < .001$). The adjusted regression showed a similar negative association ($\beta = -.248$, $p < .001$).	Higher-self-compassion students described reflection and constructive responses to setbacks; lower-self-compassion students more often described self-criticism and difficulty recovering. “I do not undermine myself. I look at possible solutions.” (Higher-self-compassion group, P3)	Convergence & complementarity: Accounts of constructive self-talk, reflection, and recovery help explain the negative association. Self-compassion may support coping with stress without removing the demands of dental training. The weak correlation also leaves substantial variation in DES scores unexplained.
Self-compassion was not significantly associated with CBA theory ($r = -.120$, $p = .089$) or practical scores ($r = -.003$, $p = .963$).	Students discussed self-talk, motivation, feedback, and clinical confidence, without describing a consistent direct link between self-compassion and assessment marks. “I change my study method or my strategy and check if it works.” (Higher-self-compassion group, P2)	Difference between perceived learning benefits and measured achievement: Students described adaptive study strategies and greater confidence, but these perceived benefits were not reflected in significant associations with CBA scores.
DES was not significantly associated with CBA theory ($r = -.041$, $p = .560$) or practical scores ($r = -.075$, $p = .289$).	Students described stress affecting concentration and confidence; some also described pressure as motivating. “I need some pressure to help me grow, perform well, and manage things.” (Intermediate group, P2)	Varied responses to pressure: Students experienced stress as both disruptive and motivating. These contrasting accounts suggest that the non-significant overall association may conceal differing individual experiences, although this possibility was not tested statistically.
The statistical models did not directly assess institutional support.	Across groups, students raised concerns about supervision, feedback, and guidance. “One supervisor is saying one thing, and another says something new.” (Intermediate group, P2)	Qualitative extension: Supervision, feedback, and guidance emerged as contextual influences beyond the variables examined in the regression models, indicating that students’ coping experiences involved both personal resources and the learning environment.

Note. DES = dental environment stress; CBA = Combined Block Assessment. Quotations illustrate participants' accounts and do not establish causal explanations for the quantitative findings

Discussion

In this single-centre study of dental students, higher self-compassion was weakly associated with lower dental environment stress (DES). The association remained statistically significant after adjustment for age, gender, and year of study, with self-compassion contributing an additional 6.1 percentage points to explained variance. Neither self-compassion nor DES was significantly associated with recorded theory or practical scores. Together with the focus group findings, these results suggest that self-compassion may be relevant to how students experience and respond to educational demands, although its relationship with assessment performance was not demonstrated.

The inverse association between self-compassion and DES is consistent with research linking self-compassion to lower burnout among medicine and dentistry students in the context of perfectionism [7], and with relationships among self-compassion, academic stress, and academic self-efficacy in nursing students [15]. However, burnout, academic stress, and DES represent related but distinct outcomes, limiting direct comparison. The weak association in the present study also qualifies the practical interpretation: self-compassion accounted for a modest additional proportion of variation in stress, while much remained unexplained. Students' accounts of workload, clinical requirements, patient care, and inconsistent guidance suggest that personal coping resources operate within an environment containing demands that students cannot readily change. This interpretation is compatible with the multiple educational sources of stress identified by Alhajj et al. [2].

Recent intervention evidence further cautions against assuming that greater self-compassion necessarily produces broader reductions in distress. In a randomised trial involving students from seven medical schools, Mann et al. [16] found that online group coaching improved self-compassion and flourishing, but

did not produce significant between-group improvements in burnout. Substantial and unequal loss to follow-up limits confidence in those findings. Nevertheless, the distinction between improved self-compassion and unchanged burnout illustrates why an association with one outcome should not be generalised to others. Our cross-sectional findings similarly cannot establish that increasing self-compassion would reduce DES; lower stress could also facilitate more compassionate self-responses, or both could reflect other influences.

The absence of significant associations with CBA scores should be interpreted in relation to the outcomes assessed. Septiawati et al. [17] reported a positive association between self-compassion and GPA among medical students, whereas the present study examined separate theory and practical scores from one assessment point. Hailikari et al. [18] also found that higher education students with high self-criticism and burnout had the lowest academic achievement. Their analysis considered patterns across several psychological characteristics, while our correlations examined individual relationships with CBA scores. These approaches address different questions: a profile associated with lower achievement does not establish that self-compassion alone has a direct relationship with marks. Differences in educational setting, assessment measures, and analytical approach therefore offer plausible explanations for the differing findings, although they were not tested here.

The qualitative findings provide complementary evidence by identifying aspects of learning that assessment scores may not capture. Students with higher self-compassion described balanced self-talk, reflection, and re-engagement after setbacks, while those with lower self-compassion more often described harsh self-criticism and difficulty recovering from negative feedback. These accounts suggest a possible pathway through responses to mistakes and feedback rather than an immediate improvement in marks. However, the study did not measure these processes prospectively or test them as mediators. Similarly, students described stress as disrupting concentration and confidence, while some experienced pressure as

motivating. This variation raises the possibility that the relationship between perceived stress and learning differs across students or circumstances; the present analyses did not test such differences.

Integration of the findings therefore supports a distinction between students' experiences of learning and their recorded assessment outcomes. The qualitative accounts help explain the educational relevance of self-compassion without establishing an effect on performance. They also extend the quantitative findings by identifying supervision, clear expectations, and constructive feedback as concerns that were not directly examined in the statistical models. These findings suggest that student support should consider both responses to difficulty and the conditions under which learning occurs. Any proposed self-compassion initiative should therefore be evaluated alongside attention to feedback and supervision, rather than assumed to compensate for difficulties in the learning environment.

The study's strengths include the use of established questionnaires, institutionally recorded assessment scores, and focus groups selected across the self-compassion score range. Nevertheless, the single-centre setting limits transferability, and the cross-sectional quantitative design prevents causality. Although the regression analyses adjusted for age, gender, and year of study, other potential confounders, including prior academic achievement, pre-existing mental health conditions, social support, and access to well-being resources, were not measured / controlled for and may have influenced the observed associations. Self-compassion and DES were measured through self-report, creating the possibility of shared response tendencies. Although CBA scores incorporated multiple formative assessments, they represented a single assessment period and may not reflect students' longer-term academic performance or all aspects of clinical and professional learning. Focus group accounts may also have been influenced by peer dynamics and the moderator's previous teaching relationship with participants. Future multicentre longitudinal studies should examine changes in stress alongside repeated assessments and measures of engagement, feedback use, and clinical confidence. Interventional studies would help determine whether improvements in self-compassion lead to sustained educational benefits.

Conclusions

Self-compassion was weakly associated with lower dental environment stress after adjustment for age, gender, and year of study, but no significant association with theory or practical scores was found. Students' accounts highlighted responses to setbacks, quality of supervision, and feedback style as relevant to their learning experiences. These findings suggest that student support should consider both learners' responses to difficulty and the conditions within their learning environment.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Review Committee of Islamic International Dental College, Riphah International University,reference number (Riphah/IRB/26/1011), date:(23-02-2026). The study was conducted in accordance with the Declaration of Helsinki. All participants received information about the study, and participation was voluntary. Electronic informed consent was obtained before completion of the online questionnaire. Separate written informed consent was obtained from focus group participants for participation and audio recording. Confidentiality was maintained.

Clinical trial registration

Not Applicable

Consent for publication

Not applicable

Availability of data and materials

The de-identified quantitative data supporting the findings of this study may be available from the corresponding author on reasonable request, subject to institutional and ethical approval. Full focus group transcripts are not publicly available because participants may be identifiable from contextual details in this single-centre study. The focus group guide, completed COREQ checklist, and de-identified coding summary are provided as Additional files 1–3.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

FE was involved in the conception of this study along with preparation, data analysis and manuscript writing. RY was involved in the design of study, critical revision and final approval of this study. SI helped in data acquisition and analysis of the qualitative data (manual thematic analysis) along with other team members. SQ critically analysed the data and helped in data interpretation. MY helped in drafting of work with conceptual framework of study.

All authors read and approved the final manuscript.

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