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ResiliDents: Development and Evaluation of Resilience Module in Dental Undergraduate Curriculum

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ABSTRACT

Introduction: The Dental profession is among the most stressful professions. This is a concern as high levels of exhaustion and psychological distress have been recorded even in early years postgraduation. Individuals with greater resilience tend to handle stress better. There are still no agreed frameworks with which to promote resilience in the undergraduate curriculum. This study aimed to inform the educational field on developing and evaluating an eLearning module to promote resilience-building competencies in dental undergraduate students in Trinity College Dublin (TCD), Ireland.

Methods: A pre-post evaluation was adopted to investigate the effectiveness of an online educational intervention module on the resilience of dental undergraduate students using the Connor-Davidson Resilience Scale (CD-RISC). All students in the latter years of the dental undergraduate programme were recruited as part of their curriculum and opted in for inclusion in the study. Data were analysed using SPSS v.22.

Results: Change in CD-RISC-25 mean score from pre to post-test was positive, increasing from 63.84 (SD = 15.69) to 68.87 (SD = 18.06) by 7.9%; this was not statistically significant. Subscale scores did not change with statistical significance apart from the coping subscale ($p < 0.01$).

Conclusion: This was the first online eLearning module to be successfully developed with a focus on key topic literature review and engagement of recent graduates to promote development of essential resilience skills in the cohort. Although the results demonstrated no significant changes in outcomes, interventions that enable students to cope and successfully manage stress are needed in the curricula. Further investigation is required to understand the development and retention of such skills in dental undergraduates.

1 | Introduction

The dental professions are recognised to be highly demanding. It has been suggested that the practice of dentistry is among the most stressful professions, likely due to a combination of the nature of professional practice and the requirement to manage patient expectations [1, 2]. These stresses can adversely impact personal well-being and eventually lead to burnout among dental practitioners and trainees [1]. Studies on burnout and stress have been reported for many years [3, 4] and even in early professional years postgraduation, the levels are concerning [5]. This is a critical concern for dental undergraduate curricula as

the same high levels of exhaustion and psychological distress have been recorded in undergraduate dental cohorts [6–8]. Dental students report highly demanding programme requirements: excessive academic workload, clinical commitments, and interactions with patients [9, 10], while transitioning from pre-clinical to clinical activities can be particularly problematic for many students [11–13]. These experiences can cause stress, poor well-being, and diminished resilience among students [14]. In turn, these can negatively impact academic performance [15], patient care [16], and attrition rates [17]. Thus, unsurprisingly, efforts to support and maintain personal resilience, that is, the ability to 'bounce back' (i.e., to recover from adverse events), and prevent burnout, focus on these potential protective factors of personal well-being [18].

In the context of this paper, resilience can be described as 'the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioural flexibility and adjustment to external and internal demands' [18]. Recent analysis of the literature proposes that resilience is a response to individual and environmental resources, rather than just a static personality trait [19] that is dynamic, and is a result of successful adaptation to stressors. Protective resilience factors, such as positive emotions, self-efficacy, active coping, hardiness and social support, etc., are modifiable by individuals [19]. This resilience framework approach postulates, that a positive appraisal style is the key mechanism that protects individuals against the detrimental effects of stress and mediates resilience factors [19]. As such, resilience is not necessarily an innate competency, but it can be developed through specific educational interventions [20, 21].

Despite being recognised as an important attribute in health professional education in recent years, there are still no agreed frameworks with which to promote resilience in the undergraduate curriculum [22–24]. When interventions have been shown to help build coping skills to reduce burnout and stress in healthcare students, they have involved a range of approaches including mindfulness-based interventions [25], conflict management and teamwork training [26], positive psychology [27] and cognitive behavioural techniques [28]. Therefore, we propose that introducing the concept of resilience skills building within an undergraduate curriculum can potentially lead to the development of these essential coping skills in students to assist in their professional development and their transition to clinical practice.

For these reasons, we developed RESILI-DENTS, a module designed to enhance resilience for dental care professional students (DCPs); including dentists, dental technicians, orthodontic therapists, dental nurses and dental hygienists. The aim of this module was for students to develop knowledge and skills underpinning resilience, thus preparing them for clinical practice following graduation. The module also imparts outcomes, which are considered essential for graduating students by the Association for Dental Education in Europe (ADEE) including: knowledge and skills of self-awareness, communication and reflection, knowing when to seek support or advice and effectively dealing with stress and burnout [29].

The purpose of this manuscript is (i) to describe the development of RESILI-DENTS, a novel module that promotes resilience in dental professional students and (ii) to evaluate the effectiveness of the educational intervention for dental undergraduate students by assessing students' resilience levels before and after the training.

2 | Methods

2.1 | Study Design

A single group pre-post evaluation was carried out to investigate the effectiveness of an online training module on the resilience of dental undergraduate students. Ethical approval was obtained from the Research Ethics Committee, School of Dental Science, Trinity College Dublin (TCD) (DSREC02022-08). The educational intervention was delivered from April 2021 to June 2022.

2.2 | Sample

A total population sampling method was applied. All students in the latter years of the dental science, dental hygiene, dental technician, dental nursing, and orthodontic therapy programmes in the School of Dental Science, TCD who enrolled in the training were invited to participate in the study ($n = 74$). Students had no previous resilience training.

2.3 | Educational Intervention

A novel educational intervention was developed for this study. Figure 1 provides an outline of the development process. The full description of the module and its development is described below.

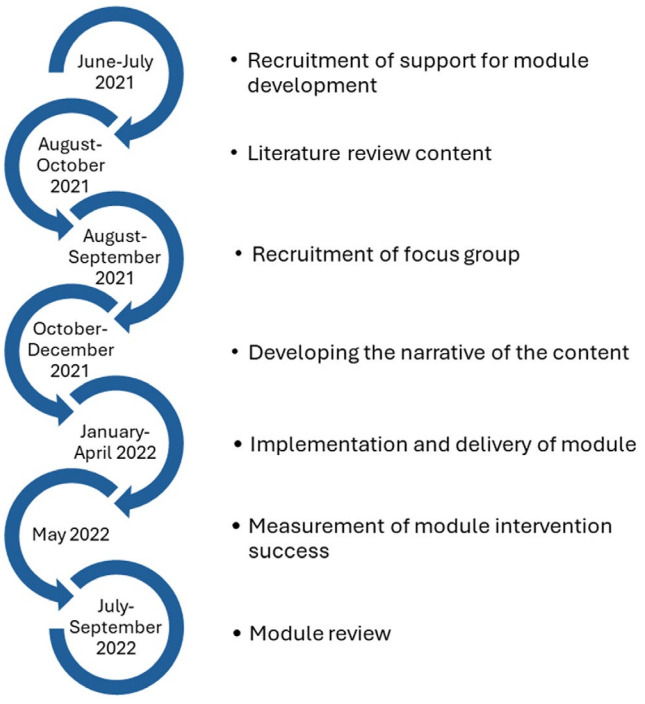

FIGURE 1 | Steps and timeline in resilience module development.

2.3.1 | Initiation

To begin, a multidisciplinary team was formed including psychologists with the role of content creation and expertise in the area, academics in dental fields providing the knowledge contribution, disciplinary insights and innovative content development with oversight of module application and delivery, academic expertise in clinical communication, contributing knowledge and reviewing module content and academic content developers for designing and structuring the module, including assessment and evaluation design and its quality assurance. Potential learning outcomes and key themes were identified from an extensive literature review. It was noted that certain competencies promote resilience in clinical practitioners and were further identified as (i) fostering critical reflection through experiences of self-compassion and empathy leads to improved practices and serves as a protective factor from exhaustion and burnout; and (ii) having supportive and meaningful relationships with individuals through enhanced interpersonal communication skills can potentially foster resilience skills in clinical practitioners. This led to the selection of candidate learning outcomes. Following this, our approach to co-designing the content and delivery of the module was implemented with a focus group of newly qualified dental students and is detailed below.

2.3.2 | Co-Design With Newly Qualified Graduates

Upon Ethical approval from the TCD School of Dental Science Research Ethics Committee (DSREC2021-04), an invitation to participate in a focus group was shared via alumni contacts and social media platforms. We opened recruitment for new graduates (2016–2021) including dentists, dental hygienists, dental nurses, dental technicians and orthodontic therapists. A single focus group ($n = 5$) was held. A semi-structured interview schedule was applied. Responses from the participants were annotated by one moderator and one notetaker. These notes were transcribed, coded and categorised, adopting deductive content qualitative analysis [30]. The focus group results are summarised in Supporting Information 1. The group covered five pre-determined themes (see scholarship of teaching and learning (SoTL) approach) on reflection in personal and professional practice; coping skills to manage emotional wellbeing; role of empathy in clinical practice; social support in practice; cultural, communication and conflict management in the team. This process led to key modifications to the prototype module. These included amendments to the content, such that connections with other learning (such as empathic practice and wellbeing) were emphasised in the module. Other modifications included restructuring of the content on conflict management skills to prepare students for the future of working in diverse teams and extension of content regarding networking and building social support relationships. In terms of delivery, the module delivery occurred later in the year than first suggested. Regarding the assessment, details on assessment criteria and grades were provided prior to the module commencement.

2.3.3 | Final Adjustments and Review

Following the consultation process, the module was built, using pre-recording of content as needed. It was then trialled by the same focus group of participants following minor practical adjustments. The sessions comprising the resilience module were reviewed in a staged process, involving a multidisciplinary and local team of experts who provided feedback on the content and delivery of the module. This ultimately resulted in agreement on the content and delivery of the final version. The module was also reviewed by a TCD Review Panel, which included senior academic and administrative staff as well as undergraduate student representatives.

2.3.4 | Underpinning Theoretical Framework

The module was developed in line with and informed by the (SoTL) approach [31] using an outcomes-based approach to student learning (OBASL). The emphasis on critical reflection, reflective practice, and individual constructivism [32–34] warranted a sound foundation for achieving desired learning outcomes. The inclusion of interactive elements was designed to stimulate student understanding of the core content. Module activities provided opportunities for developing and articulating TCD's graduate attributes (https://student-learning.tcd.ie/assessments/graduate-attributes/) for the students [32, 35].

Assessment choice was influenced primarily by the core aim of the module and its related learning outcomes reflecting constructivist theories [33], while simultaneously supporting student development as they build knowledge of the underpinning theory while 'practicing' the application of that knowledge towards building resilience as they prepared their reflective writing assignments.

2.3.5 | Final Module Outline

The module was designed and pre-recorded using the online platform Articulate Rise, delivered and hosted on the Blackboard Virtual Learning Environment, entirely asynchronously.

The module contained five sessions in total. The sessions included reflection, self-compassion, empathy, social support, and leadership components (see Tables 1 and 2 for full module description). The learning was delivered through interactive asynchronous e-Learning lectures, recorded case studies, and self-evaluations over a five-week period. All session exercises and learning activities were aligned with the overall aim and objectives of the module. Students were required to complete sessional activities prior to moving to the next session.

The assessment of each unit was designed to align with module objectives and consisted of two components. The first component included self-appraisal reflective writing pieces on the sessions, based on student reflection on recorded case scenarios, which were submitted through an online similarity check tool. A detailed rubric was provided as a guide for the reflective writing, explicitly targeting stated learning outcomes, further supported by the OBASL approach. The satisfactory completion of written reflections during and following engagement with a range of module activities enabled development and demonstration of core learning outcomes (LO1-LO4). The second component

TABLE 1 | Session content overview.

Theme	Title	Overview
1	Reflection	Students practice reflective writing and support their development as a reflective practitioner. Reflection helps to consolidate and assess student's learning of their discipline and its practices [52] Development of reflective skills also promotes self-learning and helps them to integrate their knowledge from personal and professional experience [53]
2	Self-compassion	In this session students practice self-compassion by developing self-awareness with a range of skills and knowledge required to do this effectively: identifying their self-compassion style and strengths, developing skills in mindfulness, and engaging with social support [54] Self-compassion skills are necessary to ensuring good personal self-care as well as effective delivery of compassionate patient centred care [54]
3	Empathy	In this week students focus on understanding empathy and explore different types of empathy. They also look at the challenges of verbal and non-verbal empathetic responses and learn some practical tips for their future practice [55] Students are encouraged to reflect on the sessional activities and to develop their own style of empathetic practice
4	Social support	Students look at types of social support and learn how to develop relationships of social support with networks, identify risks of isolation, benefits of social support and foster coaching engagement [56] This session aiming to provide students with skills to cultivate personal resilience through making connections and building social support with networks [56]
5	Leadership	Leadership skills are required to work effectively in a dental team, manage your own time, resources and contribute to your professional practices [57] Upon completion of this session students should be able to apply the necessary leadership skills for effective delivery of high-quality patient care and take responsibility for their own personal development [58] The leadership topics in this session include cultural awareness, building a team environment, interpersonal communication skills, and conflict management

required the completion of a final quiz that demonstrated the application of the knowledge they had gained as a result of the module. Academic integrity for the quiz was achieved by phrasing the questions in such a way that they were not easily 'Googled', setting a time limit for completion and the randomisation of the question [36]. The students had 2 weeks to complete this assessment. On successful completion of the module and the associated quiz, students received an incentive in the form of a certificate; however, it had no impact on their year progression. Furthermore, the development of additional, extended resources was created and included in the module to support students wishing to explore the topics further.

The module was aligned with the clinical practice modules across dental undergraduate curricula in all programmes. It was mandatory for all latter-year dental auxiliaries (year 2 of a 2-year programme) and dental science (year 4 of a 5-year programme) students and scheduled for delivery in Semester two with dedicated time in their schedule. The sessions were designed as self-directed for delivery and completion online. Each session was approximately 2 h in duration, having 1 h of core reading aligned to each sessional block.

2.4 | Data Collection

In order to determine the effectiveness of the new module, all students were invited to complete an anonymous online survey. The survey was shared using the Survey Monkey platform and contained 28 questions, including questions on socio-demographic parameters and items examining their resilience with the Connor-Davidson Resilience Scale (CD-RISC) [37]. The CD-RISC is a self-rating validated scale consisting of 25 items with a 5-point Likert scale. The responses were recorded based on a total summing ranging from 0 to 100, with the higher scores recording greater resilience.

In addition, the post-module survey collected feedback on students' views regarding the course experience, including content delivery, materials, activities, and the impact on their clinical practice see the results section on course feedback. Quantitative data were reported descriptively, whereas qualitative data from open responses were independently open-coded by two team members and categorised using content analysis principles.

2.5 | Data Analysis

Data were analysed using SPSS v.22. Descriptive statistics are presented to describe the sample. An overall summative 25-item scale score was established for each respondent. The reliability of the 25-item scale was established using Cronbach's alpha. Change in scale score was measured from before to after training adopting independent samples Student's *t* test, and delta change was reported. Alpha was selected

TABLE 2 | Resilience module descriptor.

Module name	Enhancing resilience in undergraduate training
ECTS weighting	5 ECTS
Semester taught	Semester 2
Module learning outcomes with embedded graduate attributes	On successful completion of this module, students should be able to: LO1. Apply principles and methodology of reflective writing to practice LO2. Demonstrate empathy in practice LO3. Demonstrate the use of making connections and building social support networks to foster personal resilience and professional development LO4. Integrate the evidence –base to enhancement of resilience in practice
Module content	Aims: The eCourse aims to develop knowledge and skills underpinning resilience in dental students Objectives: By the end of the course, students will have developed skills to write reflectively, apply social emotional learning techniques, engage empathetically, identify social support with networks in order to foster resilience and enhance professional growth Content: • Introduction to module (Week 1) • Reflection (Week 1) • Self-compassion (Week 2) • Empathy (Week 3) • Social support (Week 4) • Leadership (Week 5)

Week	Session	Class
1	Introduction to module	Asynchronous
1	Reflection	Asynchronous
2	Self-compassion	Asynchronous
3	Empathy	Asynchronous
4	Social support	Asynchronous
5	Leadership	Asynchronous

Teaching and learning methods	Teaching: resources and activities have been designed for delivery and completion online in self-directed format to include recorded interactive learning units, multimedia case studies, extended resources to support students wishing to further explore the topic Learning: knowledge check and feedback within all interactive learning session, individual critical review and decision-making regarding case studies (videos), supported self-appraisal using evidence-based models and scaffolded reflective writing. Detailed rubric is provided to guide learning and self-appraisal/self-evaluation

Assessment details

Assessment component	Assessment description	LO addressed	% of total	Week due
Reflection, self-compassion and Empathy	Reflective writing	1/2/3	25	7th week
Social support and leadership	Reflective writing	1/3/4	25	
Final evaluation/Quiz application of acquired knowledge	Quiz	1–4	50	
Completion of all activities on module		1–4		Pass/fail

(Continues)

TABLE 2 | (Continued)

Reassessment requirements	Will be determined by assessment results 50% pass
Contact hours and indicative student workload	Contact hours: 10 h 5 online e-lectures with activities =10 h Independent study (preparation for course and review of materials): Core reading aligned with each e-learning unit (1 h) specify 1 core reading for each block Recommended journals, books (links given through module) Total 50 h Independent study (preparation for assessment, incl. completion of assessment): 50 h Reviewing e-learning content materials and notes Reflective entries Self-tests—Quiz and online activities

at 0.05. Although separate reporting of subscale scores is cautioned, useful insights can be garnered through their analysis. Therefore, subscale scores for Hardiness, Coping, Adaptability/flexibility, Meaningfulness/purpose, Optimism, Regulation of emotion and cognition, and Self-efficacy are also reported at baseline and post-training to further understand the findings of this evaluation.

3 | Results

3.1 | Sample and Flow

At baseline, a total of 62 surveys were returned, representing a response rate of 84%. The majority of respondents were female (80%), and the mean age was 24.5 years (SD = 6.4). There was a mix of respondents from dental undergraduate programmes, with the majority from Dental Science (Table 3). A post evaluation recorded 39 responses in total, indicating a retention rate of 62.9%.

TABLE 3 | Socio-demographicharacteristics of the sample.

Demographics	Count (*n*)	Valid percent %
What is your gender? (*n* = 61)		
Female	49	80.3
Male	12	19.7
Status (*n* = 61)		
Dental hygiene	6	9.8
Dental nurse	16	26.2
Dental science	32	52.5
Dental technician	1	1.6
Orthodontic therapist	6	9.8
Age (*n* = 56)	Mean	SD
	24.5	6.4

3.2 | Measures of Resilience Over Time

Mean baseline scores for individual items within the CD-RISC-25 ranged from 1.8 (SD = 1.5) to 3.1 (SD = 1.1). Change in scores from pre- to post-test was mainly positive, with a range of change from minus 3.4% to plus 24.8%, with mean change in only two items reaching statistical significance (items 13 and 14) (Figure 2) and (Table 4). However, the main test of interest revealed no significant change, and while three hypothesis tests returned statistically significant results, these are possibly products of false discovery and may be disregarded.

Regarding the CD-RISC-25 scale score, Cronbach's alpha was excellent at *alpha* = 0.917, and the mean score was found to be 63.8 (SD = 15.7) at baseline. At post-test, the mean CD-RISC-25 score rose by 7.9%, which was not statistically significant (Figure 2). Subscale scores did not change with statistical significance apart from the coping subscale ($p < 0.01$).

3.3 | Course Feedback

With respect to the student's feedback on their post experiences of completing the resilience module (*n* = 39) the majority (*n* = 28, 71.8%) reported that they would recommend the e-learning resilience module to other healthcare professionals and colleagues. Further feedback on the use of technology was reported in Figure 3. A total of twenty-eight open text responses broadly aggregated in three categories: utility of the module, personal gain and the acquisition of new learning. Twenty-five percent of students (*n* = 7) reported that the resilience module enhanced their knowledge and provided valuable concepts. They also commented on learning skills (*n* = 11) that positively influenced their resilience, such as coping, practicing mindfulness, self-compassion and empathy. Some of the most interesting quotes included 'important to surround yourself with happy and successful people' and 'it fortified my knowledge in trying to see every situation bad or good in different perspectives'. Additionally, a number of students (*n* = 7) reported on the relevance and applicability of the module, stating

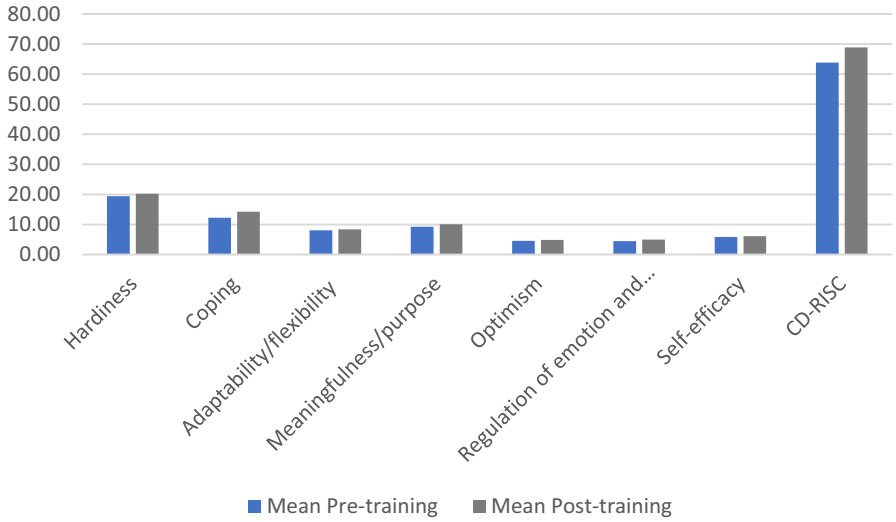

FIGURE 2 | Change in CD-RISC scale and subscale scores in hardiness, coping, adaptivity/flexibility, meaningfulness/purpose, optimism, regulation of emotion and cognition, and self-efficacy.

that they 'learned a few valuable concepts that will empower me personally and professionally'.

4 | Discussion

This study describes the development and evaluation of RESILI-DENTS, a novel module aiming to enhance resilience as part of dental undergraduate curricula. To our knowledge, this module is the first to have attempted to incorporate the development of resilience skills in dental undergraduate curricula in the world.

The study found that while the intervention was associated with a positive increase in RISC-25 score of 7.9% from pre- to post-test, this was not statistically significant. However, the *Coping subscale* did demonstrate statistically significant improvement, increasing by 16% from baseline. It can be argued that separate scoring of the CD-RISC 25 subscales is partially dependent on the context, geographical location [38] and spiritual beliefs [39] of subjects; therefore, separate scoring is not recommended for reporting. However, based on the construct of the CD-RISC 25 scale assessing and identifying resilient characteristics, several studies utilised specific factors and items [40, 41] to demonstrate the prediction of emotional exhaustion (burnout), depression and suicide [42]. This is not surprising since coping is an imperative skill to attain and use when dealing with adversity and stressful events [16, 43]. Enhancing protective factors is more effective than reducing the risk factors to improve resilience [44]. Therefore, protective resilience factors, such as active coping, are the key mechanism that protects individuals [19]. Enhancing coping mechanisms used by individuals to manage the demands of stressful situations can promote resilience and is imperative to develop.

It is important to contextualise the results of this study by comparing them to other studies using the same outcome measures. This comparison allows for an assessment across different studies and formats aimed at enhancing resilience, which can vary significantly. In context, our intervention seems to deliver minor improvement, which is consistent with other published efforts that used CD-RISC 25 for their primary outcome. Interestingly, the time students invested across interventions did not seem to offer a dependent response, with modestly effective interventions ranging from two-hour sessions over four (14.5% increase in CD-RISC score) [45], six (10% increase in CD-RISC score) [43] and even 10 weeks (7.6% increase in CD-RIS score) [28]. These support that resilience levels are not static and could change over time at various stages of one's development [46] more as a process that is dynamic, and perhaps the interventions need to be increased in length for the score changes or fluctuations that can be observed over time.

To note, the overall course feedback appeared to be positive. Given that case scenarios and role play [47] are well accepted by learners and help the promotion of their engagement [48, 49] it is not surprising that overall module feedback on the delivery of the content was positive and well accepted by the students. Resilience training is becoming popular; however, face-to-face delivery presents challenges for accessibility, participation [50] but also cost and availability [51].

Whilst the online module delivery offers flexible and convenient access [53] it may arguably improve students' performance, especially those who may not be as confident participating in a traditional classroom setting [54], or lecture-based learning group [55]. This can explain the feedback from our study, where the majority of students found learning about resilience and using technology to be valuable and straightforward. Nonetheless, delivering these interventions in a digital and self-directed format makes them more accessible and affordable than face-to-face training.

4.1 | Implications

This manuscript provides useful information on how to develop an educational intervention that promotes resilience in undergraduate dental curricula. Given the steady increase in

TABLE 4 | Descriptive statistics, internal consistency of scores and comparison of scores by factor.

	Pre	Mean	Std. Deviation	Post	Mean	Std. Deviation	% Change from baseline	*p*
1a	62	2.92	1.00	39	2.82	0.88	−3.4	$p > 0.05$
2a	62	3.03	1.10	39	3.33	1.03	9.9	$p > 0.05$
3a	62	1.85	1.48	39	2.31	1.40	24.4	$p > 0.05$
4a	62	2.56	0.93	39	2.64	1.01	3.0	$p > 0.05$
5a	62	2.90	0.92	39	2.95	1.02	1.6	$p > 0.05$
6a	62	2.39	1.12	39	2.54	1.05	6.3	$p > 0.05$
7a	62	2.34	1.10	39	2.69	1.00	15.1	$p > 0.05$
8a	62	2.56	1.00	39	2.92	1.06	14.0	$p > 0.05$
9a	62	2.52	1.26	39	2.67	1.30	6.0	$p > 0.05$
10a	62	3.10	0.94	39	3.13	0.89	1.0	$p > 0.05$
11a	62	3.05	1.02	39	3.05	0.83	0.1	$p > 0.05$
12a	62	2.82	1.00	39	3.05	0.76	8.1	$p > 0.05$
13a	62	2.32	1.00	39	2.90	0.91	24.8	$\mathbf{p < 0.01}$
14a	62	2.15	1.14	39	2.59	0.88	20.7	$\mathbf{p < 0.05}$
15a	62	2.39	1.09	39	2.72	1.00	13.9	$p > 0.05$
16a	62	2.16	1.13	39	2.33	1.01	8.0	$p > 0.05$
17a	62	2.73	1.12	39	2.97	0.99	9.1	$p > 0.05$
18a	62	2.18	1.15	39	2.59	0.97	18.9	$p > 0.05$
19a	62	2.34	1.05	39	2.38	1.07	2.0	$p > 0.05$
20a	62	2.18	1.02	39	2.49	0.85	14.2	$p > 0.05$
21a	62	2.69	1.21	39	2.62	1.21	−2.9	$p > 0.05$
22a	62	2.31	1.14	39	2.67	1.13	15.6	$p > 0.05$
23a	62	2.37	1.06	39	2.56	1.02	8.1	$p > 0.05$
24a	62	2.87	0.91	39	2.82	1.02	−1.8	$p > 0.05$
25a	62	3.11	1.09	39	3.13	1.06	0.5	$p > 0.05$
CD-RISC-25	62	63.84	15.69	39	68.87	18.06	7.9	$p > 0.05$
Hardiness	62	19.42	5.07	39	20.23	5.35	4.2	$p > 0.05$
Coping	62	12.26	3.25	39	14.23	3.48	16.1	$\mathbf{p < 0.01}$
Adaptability/flexibility	62	8.05	2.38	39	8.38	2.45	4.2	$p > 0.05$
Meaningfulness/purpose	62	9.24	3.50	39	10.08	3.93	9.0	$p > 0.05$
Optimism	62	4.55	1.70	39	4.87	1.82	7.1	$p > 0.05$
Regulation of emotion and cognition	62	4.48	1.81	39	4.97	1.72	10.9	$p > 0.05$
Self-efficacy	62	5.84	1.80	39	6.10	1.87	4.5	$p > 0.05$

Bold values indicate the significance of 13a $P < 0.005$. Bold values indicate the significance of 14a $P < 0.041$.

psychological stress in this cohort and its corresponding negative effects among them, interventions that enable students to cope and successfully manage stress, such as the one described here, are needed. Fostering the resilience of our future DCPs may not be easy, but it is crucial to equip them with the skills they need to manage work-related stress and to avoid burnout. Furthermore, collaboration with new graduates to explore novel and contemporary methods and modes of learning will help to make the intervention more efficient, cost effective, and meaningful to the cohort. The development of this module has the

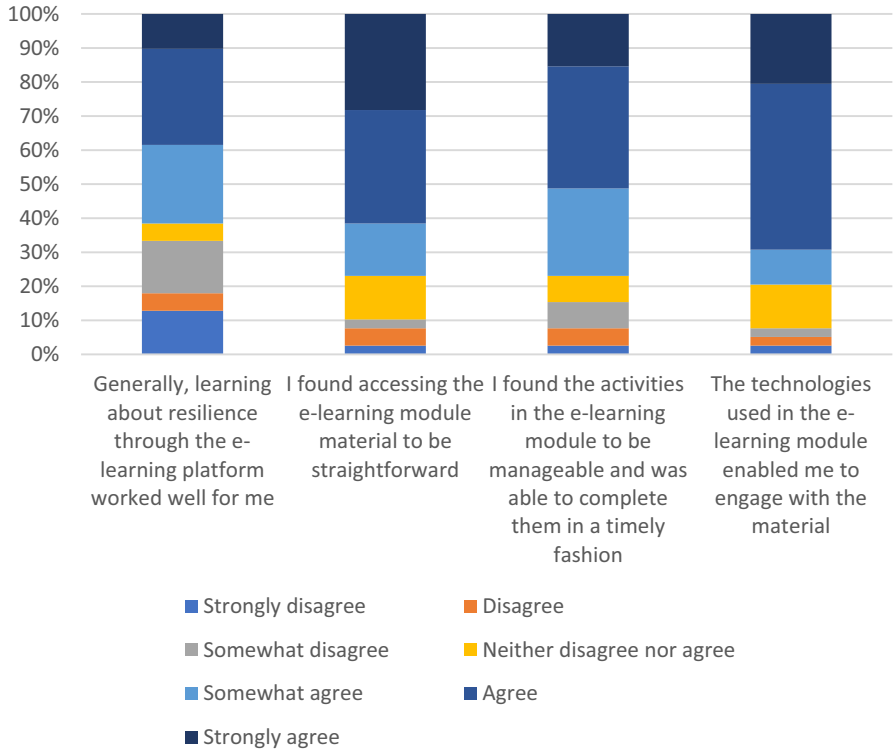

FIGURE 3 | Experience of the content delivery and technology use. How strongly do you agree that the activities below added value to your own learning?

potential to be a useful template for further application in other healthcare disciplines. The lack of any harmful effect from this training is also reassuring. Further research is needed on the assessment of module impact and improvements from the student perspective. In the future, the module will benefit from incorporating a student-to-student peer review component for the first reflection and feedback component. Additionally, it could also include a credit award for completing the module.

4.2 | Limitations

There are several limitations in this study. The study used self-reported questionnaires; therefore, it was not possible to exclude social desirability bias. The long-term outcomes of the intervention and their sustainability are unclear. The sample from one institute, one geographical location, and the absence of the control group also limit inferences. The absence of the control group from the convenience sample was due to the chosen educational framework. The real-world, natural design of this study meant that it was impossible to include a control group. Therefore, the design, a non-controlled pre-post design, does not infer the ability to speak of causality. Although every effort was made to control for confounds, the changes observed cannot be solely attributed to the intervention. The participants' mental health status was not recorded; therefore, we do not know what their mental health was like before the study. Although it was designed to encourage resilience, the introduction of an additional component with associated assessments to the curriculum possibly added to the stress of students, as this represented an additional burden for them during the academic year. Unfortunately, no other material was removed from the curriculum to make space for the module. Future research that incorporates a control group, assesses mental health, and delayed post-test evaluation will help to further define module impact.

5 | Conclusion

This is the first online eLearning module developed to enhance resilience across dental undergraduate curricula, with key content literature review and, crucially, by engaging new graduates. According to CD-RISC-25 scores, the degree of change in resilience from pre-to post-training was associated with modest change, a finding similar to other interventions that aimed to promote resilience in dental students. Nevertheless, the qualitative results suggested that the resilience-building module has the potential to be beneficial.

Author Contributions

Sviatlana Anishchuk: conceptualisation, investigation, writing – original draft, funding acquisition; **Caoimhin MacGgiolla Phadraig:** data curation and analysis, writing – review and editing. **Cicely Roche:** conceptualisation, writing – review and editing; **Angela Kubacki:** writing – review and editing; **Derek Sullivan:** writing – review and editing; **Yvonne Howell:** conceptualisation, review and editing; funding acquisition.

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Ethics Statement

Ethical approval was obtained from the Research Ethics Committee, School of Dental Science, Trinity College Dublin (DSREC02022-08 and DSREC2021-04).

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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