Enhancing Pharmacy Education: Evaluating and Strengthening Resilience Among Final-Year Students

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Abstract

This work analyzed how final year pharmacy students used resilience, both according to a resilience score and a cohort's experience, to determine the university's role in fostering this skill. Methods: permission and invitations were received to take part, data from Queen's University Belfast students were collected using a pre-piloted paper-based questionnaire. I used descriptive statistics. The significant gender differences ($p < 0.05$) were measured using the Welch Two Sample t-test for the CD-RISC-25 and the Mann-Whitney U Test and Chi-squared test for Section B . Outcome: In this study, 80.61% of individuals answered the questions (79/98). The mean score for CD-RISC-25 was higher for males (not significantly so), at 70.39, compared to the score of 67.18 for females ($p = 0.2355$). Although most individuals believed the School should teach resilience, few <20.00% actually participated in the free resilience classes. It was thought activities strengthening students' ability to bounce back included mistakes being safe for students, while high grades were needed to pass assessments. The next step should be to consider how resilience can be increased among upcoming pharmacists at Queen's University Belfast. A strategy created based on the research at one institution will now be used to improve the curriculum by providing students opportunities to build resilience.

Keywords: ***CD-RISC-25; pharmacy student; questionnaire; resilience.***

1. Introduction

Being resilient is very important for health care workers, especially now during the COVID-19 pandemic. In healthcare programs, students have to cope with a lot of work, stressful exams and learning about different health challenges from experience at the hospital. Many times, students studying healthcare subjects experience mental health issues such as trouble sleeping, depression, anxiety and worrying. In severe cases, suicide also becomes a concern. These problems in mental health may cause students to have difficulties with thinking clearly and can result in them feeling burnt out.

Similarly, working in healthcare can make a professional feel less resilient and that, in turn, might negatively influence their health and increase their risk of burning out. This situation impacts their job, possibly lowers the standard of patient care and can also raise the risk of errors. Since this topic is significant, no surprise that a global community of practice dedicated to pharmacy workforce resilience has just been founded(1).

Different tools have been made to evaluate an individual's level of resilience. Windle and his colleagues assessed nineteen tools that are meant to be used both with those getting general assistance and those in clinical settings. Among these assessment tools were the Connor-Davidson Resilience Scale (CD-RISC), the Resilience Scale for Adults, Brief Resilience Scale, Ego Resilience and Psychological Resilience. The researchers concluded that the CD-RISC, the Resilience Scale for Adults and the Brief Resilience Scale had the best psychometric properties. Keep in mind that this article has been cited over 2,000 times, yet it is ten years old. There are three releases of the CD-RISC: CD-RISC-2, CD-RISC-10 and CD-RISC-25.

While some researchers depend on these scales, others are working on tools aimed at specific areas. Chisholm-Burns and his colleagues designed and used a scale to assess pharmacy students for their capacity to overcome difficult situations in their studies. According to the researchers, the APRS-16 tested in this study was reliable and valid for measuring academic resilience in pharmacy students.

There is not much published research focused on resilience in pharmacy education. Students from three pharmacy schools in the UK (the number of respondents was 1,161) were asked to take academic resilience and wellbeing tests. The researchers noticed that academic resilience was greater among first-year students than students in later ones. They also noticed that pharmacy students' resilience differed by their school and gender, but not by their ethnicity.

Other studies aim to create strategies that help individuals become more resilient. A study aimed at helping practicing pharmacists deal with difficulties was conducted in the United States. At Monash University in Australia, resilience is an important skill included in undergraduate pharmacy programs. The University of Otago in New Zealand has chosen this year to add a resilience workshop as part of their fourth-year undergraduate pharmacy course. Certain educators concentrated on ensuring that pharmacy students stayed strong and healthy while coping with the challenges due to COVID-19 conditions(2).

Carrying out research on final-year pharmacy students' resilience at Queen's University Belfast helps enhance the evidence related to resilience, mainly from the UK. Most studies on resilience in healthcare students have examined medical and nursing students more than pharmacy students, aside from those mentioned above. The research has guided school leaders in creating strategies to encourage future pharmacists to look after their wellbeing as they transition into their professional life.

The research was undertaken to explore the resilience of Year 4 MPharm students at Queen's University Belfast (using the CD-RISC-25) and to discover what role the School of Pharmacy played in developing resilience. Besides, the study attempted to identify what parts of the MPharm course students valued as most useful for becoming more resilient and if gender was an influencing factor.

Today, many experts say that resilience has become very important for medical professionals and that's why this study is relevant. Among their many responsibilities are a heavy workload, more duties in the clinical setting and dealing with changes in the health care field. Going from being a student to working as a pharmacist is challenging and getting stronger throughout their studies may assist graduates in facing such obstacles. In addition, the job of a pharmacist regularly involves more responsibility and varied duties which requires emotional strength for success and good health.

Throughout its analysis, this study gave valuable suggestions that can help in improving student resilience and in updating the curriculum(3). Comprehending how gender may influence resilience can allow for proper planning of interventions. By enhancing their ability to adapt, pharmacy students improve themselves and also strengthen the entire healthcare field in responding to challenging times.

2. Materials and Methods

All students included in the study were Year 4 scholars enrolled in the Queen's University Belfast MPharm program for 2021-2022 (n = 98, apart from research student S.C.). Since the students were about to graduate and become part of the workforce, their resilience was deemed a useful aspect to investigate.

The device I used for gathering information was an instrument for data collection

Paper-based questionnaires were provided to collect the data. Until the questionnaires were submitted, participants in the research study were informed that they had the right to drop out at any time without having to explain why. The guidelines for the study outline that joining or not joining would not result in any specific advantages or disadvantages. Participation was allowed after giving a signature on the first page of the questionnaire.

Research found in the field of resilience was used to create the questionnaire which had three parts. All items from the CD-RISC-25 (containing 25 questions) were part of Section A, as this section measured factors like resilience, hardiness, coping ability, how adaptable or flexible an individual is, the level of purpose in their life, optimism, control of emotions and self-efficacy(4). Although the parameters overlap to some extent, according to the CD-RISC-25 authors, each item measures a unique characteristic associated with resilience.

The section addressed the ways Queen's University Belfast School of Pharmacy was perceived by students for fostering their ability to overcome challenges. The authors explored which aspects of the MPharm curriculum students believed helped them to be more resilient. The statements arose from the researchers' previous studies about stress and stressors in the MPharm student population.

In section C, they only asked one question about gender. The data on age and ethnicity was not collected to avoid any chance of identifying students with-in the class cohort. Most of the questions in the survey were closed-ended and were rated using a 5-point Likert scale.

Instrument Validation

The questionnaire was tested to ensure it was reliable. Authors of the scale for Section A (CD-RISC-25) note that it has been proven reliable across multiple nations and any changes in the questionnaire are not permitted by them.

The requirements were strictly followed by the researchers.

The questionnaire was tested with five colleagues from Queen's University Belfast. Because Section A of the questionnaire could not be shared due to the CD-RISC-25's protecting rules, the testing was carried out with five PhD students and post-doctoral staff who knew the content of Section A. Conclusions from the pilot phase led to small updates in Section B for better understanding and relevance.

Aspect	Details
Study Population	Year 4 MPharm students at Queen's University Belfast, 2021-2022 cohort (n = 98, excluding S.C.)
Study Objective	Investigate resilience of final-year students preparing to join the workforce
Data Collection Instrument	Paper-based questionnaire
Ethics and Consent	Participants informed of right to withdraw anytime; participation voluntary; consent via signature
Questionnaire Structure	- Section A: CD-RISC-25 scale (25 items on resilience and related traits)
	- Section B: Perceptions of School of Pharmacy's support in fostering resilience (stressors, curriculum aspects)
	- Section C: Gender question only; no age or ethnicity collected for anonymity
Response Format	Mostly closed-ended questions rated on 5-point Likert scale
Instrument Validation	- CD-RISC-25 used as per author guidelines (no modification allowed)
	- Pilot testing done with 5 PhD/post-doc colleagues familiar with Section A content
	- Minor edits made to Section B after pilot
Data Collection Timing	November 2021 during mandatory classes; one-time data collection
	- Thematic analysis for qualitative responses in Section B
Study Limitations	Single institution and cohort; one-time measurement limits generalizability
Strengths	Use of validated resilience scale, high response rate, combined quantitative and qualitative data
Research Outcome	Assessed resilience levels of final-year students and identified curriculum elements enhancing resilience

TABLE 1 Methods

Steps for Collecting Data

In November 2021, the questionnaire was passed out in all mandatory classes. The students were given an email notice in advance with the participant information sheet, but the questionnaire was not included. The data was collected just once instead of being gathered multiple times as a method for comparison.

Data Analysis

The Microsoft Excel® app was used to code the questionnaire answers and add them in January 2022. The CD-RISC-25 was rated by following the authors' guidelines, adding each of the 25 items (scored from 0 to 4) and the total ranging from 0 to 100, with a greater total showing more strength to cope(5).

Most of the analysis involved describing the data using frequencies and percentages. Since most of the data in Section B were non-parametric (nominal or ordinal), the Chi-squared and Mann-Whitney U-tests were employed for

comparing men and women, taking statistical significance to be $p < 0.05$.

The response to the open question in Section B of the questionnaire was studied for common topics and themes using thematic analysis. It consisted of understanding the information, creating the first codes, seeking themes in it, reviewing those themes, adding themes, naming them and finishing the analysis.

The researchers paid attention to the rigor of methods in the study's design and implementation. It was noted that because the study captured resilience only once and used data from a single organization and group, results may not apply to everyone. Even so, applying a tested resilience tool, maintaining a high response rate and combining quantitative and qualitative data improved how the research was conducted.

By using this approach, the researchers could better judge how resilient the final-year students were and recognize the educational features that improve resilience.

3.Results

Answering about Response Rate and Demographics

Just under 81% of people who were sent the questionnaire replied to it (79 out of 98). Everyone except one of the respondents finished the questionnaire. 23 people in the survey identified as males (29.11%), 55 people identified as females (69.62%) and 1 participant left the gender question unanswered (1.27%). All the raw data from the 79 individual questionnaires is presented in the supplementary material named S1(6).

Results from the CD-RISC-25 (the A section of the questionnaire)

Table 2 reports the students' average, standard deviation and median scores for the assessment's CD-RISC-25 instrument. On average, males scored higher (70.39), yet the difference between male and female students was not significant based on the Welch two-sample t-test ($p = 0.2355$, $t = 1.2036$, $df = 41.904$).

Table 2. The CD-RISC-25 mean, standard deviation and median scores for the 79 people are given, with the scores divided into male and female parts. The scores could fall between 0 and 100.

	All	Male	Female
Mean score	68.01	70.39	67.18
Standard deviation	10.82	10.69	10.86
Median score	67	71	66

TABLE 2 CD-RISC-25 mean score

Building Resilience with the Assistance of the QUB School of Pharmacy

In Table 2, you will find the responses given to the twelve verbatim statements in Section B. Based on the Mann–Whitney U test, there were no important differences between men and women for any of these statements. Nearly everyone believes that future pharmacists should be resilient (100%) and that QUB School of Pharmacy should promote developing this ability (93.67%)(7).

Resilience development had the highest interpolated median scores (more than 4) for the following statements.

- The requirement to get a high grade to pass (4.31).
- Taking objective structured clinical examinations (OSCEs) and similar tests (4.12)
- I found it valuable to be able to make mistakes in practice settings and learn what I had not done right (4.23).
- Going through work-based placements (4.01)
- Overcoming obstacles that occur during the MPharm degree (4.05)

Based on the results, students thought the help and advice offered by personal tutors had less of an effect on their resilience.

Respondents in the study were also asked to report their level of resilience at two separate times using a scale that ranged from 1 to 10. Figure 1 represents the self-rated level of resilience that students had at the start of their

MPharm degree (September 2018 for almost all students) compared to where they are now (November 2021, with examinations planned for May 2022).

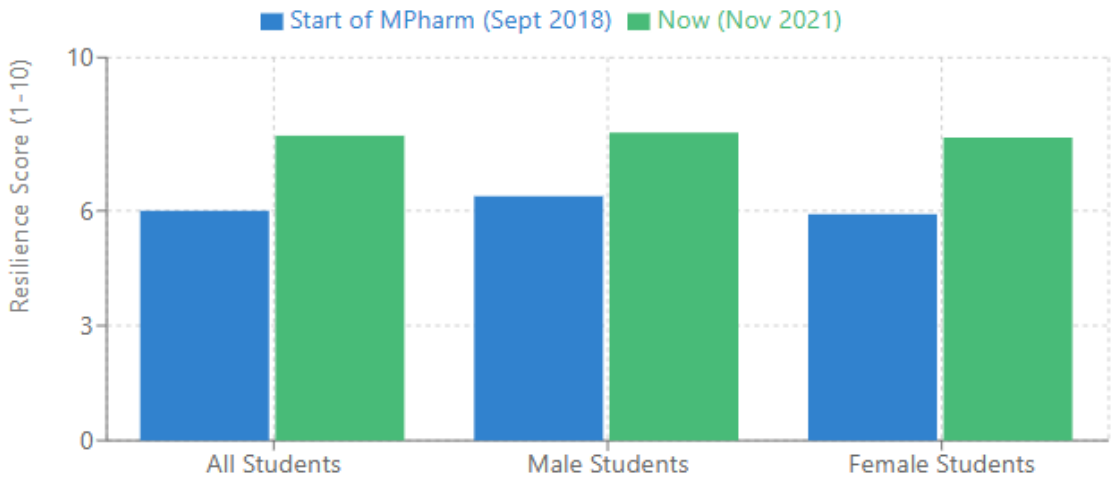

FIGURE 1 Pharmacy Students' Self-Reported Resilience Levels

Figure 1. Self-reported resilience scores (median scores) were measured at the start of the MPharm degree and again now and p and Wilcoxon signed-rank V-statistic values are included for all 78 students. The score ranged from 1 to 10 and 1 meant low resilience and 10 indicated high resilience.

As you can see in Figure 1, individuals felt that resilience levels were greater by the time they completed this questionnaire compared to the start of their degree. At the initial testing and again in the present, men expressed stronger resilience than women (6.38 versus 5.91 and 8.04 versus 7.91). In females, there was a much higher increase (2.0 points) between the two months compared to males (1.66 points).

In Section B, the third question focused on taking part in resilience-building activities. As demonstrated in Figure 2, the majority of students enrolled in the university did not participate in any learning activities for developing resilience. Reportedly, a greater number of female students than male students said they took part in free resilience activities or events run by the QUB School of Pharmacy (18.2% were female versus 4.3% male; $p = 0.047$).

Students also had an opportunity in the open-response part to add more about resilience. When we analyzed the responses, certain themes were found(8).

Ida thinks that goal setting and keeping a diary helped her to be more resilient. (R66)

It is up to individuals to improve their resilience, as the university may not give enough guidance on what pharmacists will experience. When I have spoken with pharmacists in their shops, they say they needed to pick up knowledge of this on their own. (R27)

I think it's important to strengthen my impressions in a context where there is no evaluation. Even so, I criticize myself afterwards, but if I don't stop to think, I think I did great to take part. (R3)

Working on IPL scenarios together with others will increase my resilience. (R14)

Health impacts - "Sometimes, my health problem has made it harder for me to cope inside and outside my MPharm degree." Even so, I believe I am hard-working and motivated to continue. (R49)

Issues related to home and the burden I carry on my shoulders made me more capable than anything I faced at university. (R25)

Certain classes played an important role and I believe the Level 2 extemporaneous dispensing section improved my resilience. (R54)

These results reveal students' feelings about building resilience as pharmacy students and suggest ways to improve the curriculum.

4. Discussion

The mean score of resilience (CD-RISC-25 test) for final-year students at Queen's University Belfast was 68.01. An interesting aspect is that the Cochrane review obtained higher results than the 2019 Trinity College Dublin trial, as well as observed higher scores in studies focused on Chinese medical students compared to their samples. Therefore, the average score in this study is lower than that seen for senior-level baccalaureate nursing students in North Carolina (n = 27). In line with studies done in China, Canada and Nigeria, the research shows that male medical students tend to have higher CD-RISC-25 scores than female students in the United States.

The mean resilience score in this study came out to be similar to the mean reported in studies done with outpatients in the USA many years ago. However, it is important to point out that students participating in the research were dealing with worries about COVID-19 at the time of the study. In previous studies, Cassidy and team found that the academic resilience and wellbeing of UK pharmacy students was lower than other student groups, even though different measures were used aside from using the CD-RISC-25.

The respondents stated that future pharmacists should be resilient and 93.67% agreed that the university should prioritize fostering that attribute. This result is consistent with previous studies focused on how resilience helps in the nursing field. Despite agreeing that such events are valuable, only a small portion of people indicate they participated in extracurricular resilience exercises during their study in MPharm. It implies that there may be barriers like people just not knowing, needing time for other events or not seeing why they should attend. Intriguingly, more female students took part in school or university efforts to build resilience than male students, but they still recorded lower average scores on the CD-RISC-25 scale which makes their effectiveness questionable.

Cochrane Review researchers, when investigating healthy coping skills in future healthcare professionals, studied approaches such as mindfulness, being coached on specific behaviors, active resolving problems, cognitive behavioral methods and learning positive thinking. In comparison to the control groups, the study listed very weak evidence that training resilience leads to increased resilience (based on 9 studies and 561 participants), a decline in anxiety (according to 7 studies and 362 people) and less perceived stress (as seen in 7 studies and 420 participants). But the authors pointed out that improved ways of studying are required before any final conclusions can be made. Likewise, Seo and his team carried out a review to investigate how resilience programs performed in the curricula of medical students and doctors in 21 studies. Because the duration, delivery and content of the programs did not align well, they thought more research is needed to choose the best strategies for enhancing resilience.

Students' responses to the survey indicated that their level of resilience increased from when they began their MPharm degree in 2018 to when they answered the survey in 2021. According to the survey, achieving high grades, successfully fulfilling gateway assessments such as OSCEs, gaining experience in simulated areas, having work experience and coping with academic challenges gave the biggest support to becoming resilient. All of these experiences usually involve thinking and learning by yourself, facing limited time and seeing significant results. Students often encounter situations in professional practice simulations and OSCEs where an error such as mixing up drug doses or missing drug reactions, reaches zero points, just as it would in real-life pharmacy. Those who participated in the survey preferred having options for practice and feedback in simulations rather than being tested right away. Due to this discovery, curriculum changes may be needed as MPharm students in the UK will spend more time learning on placements, following new guidelines from the General Pharmaceutical Council.

It is also important, from a broader viewpoint, that education in pharmacy prepares learners for the challenges they may face in their careers. It is important for aspiring pharmacists to handle difficult situations with patients and stay attentive to various professional demands. On the other hand, some studies point out that a few students have difficulty being resilient in school which makes it easier for minor problems to stress them and affect both their concentration and their results. This makes people wonder if the current way we teach in schools is sufficient for students entering the job market. A few researchers are looking into alternative measures of academic tenacity to assess how important they are for a student's success, alongside well-known aspects such as grit. Organizations involving pharmacists should also create programs to help younger professionals manage their stress and become more resilient.

This is important because the new General Pharmaceutical Council Standards allow pharmacists to prescribe medications on their own. Because pharmacists must prescribe for patients with complicated cases from the start of their careers, they will need more strength than they do today.

Even though this study prepared a valid tool, collected responses from most participants (80.6%) and chose a unique

cohort of healthcare students, some weak points should be noted. Only gathering data at one location and one specific cohort makes it difficult to generalize the findings and the design does not follow the participants' development over time. Even so, what was found helped shape an effective strategy to give students broader opportunities to learn resilience in their pharmacy courses.

5.Conclusion and Future work

From this research, we were able to see the levels of resilience in future pharmacists at Queen's University Belfast and discover what learning methods are useful in building resilience. Judging by the assessment results and what these students believe, more work is needed to boost their resilience prior to becoming pharmacists. Students were moderately resilient, as the average CD-RISC-25 score reflected this and there was only a little difference in results between men and women.

Students believed that having resilience is very important for pharmacy practice and 93.67% thought that their school should do its best to nurture such abilities in them. It is good to note that self-reported resilience higher by the final year, signaling that what students experience during pharmacy education helps boost their resilience, even if this boost is not perfect. Researchers pointed out that the main educational components that build resilience are high-level assessments, examinations for progression, simulations that allow people to recognize their mistakes and learning through job placements.

A very low number of students join resilience-building activities (only 2 out of every 10) despite acknowledging how valuable resilience is. Because of this, it is important to ensure resilience-building is included in the main curriculum instead of offering only occasional extra activities. Students wanted to have a safe and stress-free environment to gain strength through assessment-free activities such as considering real case studies and practicing what they learn.

Consequently, a thorough ten-point strategy has been designed to add more opportunities for resilience in pharmacy education. Examples of this are structured beginnings for students, providing them with additional support as they learn, proven resilience programs, enhanced opportunities for reflection, closer student-tutor relationships, guidance on assessments, building strong peer connections, more wellbeing resources and more effective teaching and assessing methods. These approaches focus on addressing the challenges they found, combining them with elements from education that strengthen individuals.

Due to increased scope and responsibilities in recent pharmacy laws, it is now crucial for pharm academics to develop resilient experts in the profession. Thanks to this study, the knowledge about resilience in pharmacy education has expanded and further investigations aimed at evaluating the impact of resilience-focused activities can now occur. Even though this study cannot be applied widely due to its design, the results have helped improve courses and may be useful for other pharmacy programs looking to develop students' resilience.

Resilience in pharmacy students ensures they maintain their health and are able to serve patients safety and effectively for a long time. Developing empathy in students is crucial for their future effectiveness and consideration to patients in tough healthcare conditions.

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Conflicts of interest

The authors have no conflicts of interest to declare

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