

RESEARCH ARTICLE

An investigation of academic resilience, resilience, and empathy in pharmacy students: Implications for pharmacy education

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Abstract

Background: Resilience supports pharmacists and students in thriving in challenging healthcare and academic environments. Empathy is necessary to provide patient-centred care. Knowledge of how these attributes influence pharmacy students is limited, and correlations between academic resilience, empathy, and academic success continue to be explored. **Methods:** This study explores the relationships between levels of academic resilience, resilience, and empathy with the academic achievements of pharmacy students at a Malaysian university. Participants were pharmacy students enrolled from 2020/2021 to 2022/2023. Academic resilience was assessed using the Academic-Pharmacy-Resilience-Scale-16, resilience through the Brief-Resilience-Scale, and empathy with the Kiersma-Chen Empathy-Scale. Scores were related to students' academic grades. Both descriptive and inferential statistical methods were utilised to analyse associations among variables. **Results:** Responses were received from 359 students. The levels of resilience of students were deemed to be moderate. Small, statistically significant variations were found in academic resilience scores across cohorts, resilience scores, and empathy scores in relation to gender. Academic resilience showed a correlation to academic grades. **Conclusion:** Academic resilience positively correlated with academic success and was positively influenced by work experience. Strengthening students' resilience in pharmacy education may support their academic achievement, particularly during times of change like the COVID-19 pandemic.

Introduction

Healthcare students are exposed to various daily stressors, ranging from academic pressure and financial challenges to clinical and psychosocial stressors (Beall *et al.*, 2015). The emergence of the COVID-19 pandemic added further challenges relating to adaptations to online learning and uncertainties around the availability of clinical placements and experiential learning opportunities, for example (Alsoufi *et al.*, 2020; Calhoun *et al.*, 2020). Resilience, broadly defined as a dynamic process involving adaptation and recovery from challenges and constructive dealing with adversity, can support students in navigating changes

and challenges (Robertson *et al.*, 2016; American Psychological Association, 2022). For example, higher levels of resilience have been shown to reduce depression, enhance quality of life, diminish exhaustion, and foster a positive academic perspective among medical students (Dyrbye *et al.*, 2010).

In healthcare education, academic and general resilience play distinct yet interconnected roles in shaping student experiences. Specifically, academic resilience allows students to persevere through challenges such as demanding coursework and exam pressures and is influenced by factors like teaching support and peer dynamics (Martin, 2013; Chisholm-

Burns *et al.*, 2019). While closely related, general resilience extends beyond the academic sphere to encompass a broader range of challenges and adversities that students may face in life. It builds on a comprehensive set of skills that equip students to manage difficulties across multiple domains. The primary distinction between the two lies not in their fundamental nature but in the challenges or adversities they address. Both forms of resilience are interrelated and contribute to the holistic development of healthcare students.

Recent research has begun to explore the relationship between academic resilience and academic performance among healthcare students. Although some studies have found that higher levels of resilience are correlated with better academic outcomes, particularly in stressful and demanding fields such as nursing and medicine, the relationship between academic resilience and academic success remains inconclusive (Brennan, 2017; Cleary *et al.*, 2018; Brewer *et al.*, 2019).

Some studies suggest that higher levels of resilience contribute significantly to academic success in undergraduate students, complementing aptitude and socioeconomic status; for example, nursing and psychology students have shown that resilience positively influences academic success (Hartley, 2011; Kotze & Kleynhans, 2013; Beauvais *et al.*, 2014; Chow *et al.*, 2018; Hwang & Shin, 2018; Lekan *et al.*, 2018). Recent studies have also investigated relationships between resilience and academic success among pharmacy students (Hagemeier *et al.*, 2020; Abubakar *et al.*, 2021).

Empathy is another essential attribute for healthcare professionals as it contributes to healthcare-patient relationships and the ability to take care of oneself (Hojat, 2007). In the healthcare context, empathy is more than just understanding; it involves deeply connecting with patients to grasp their feelings, perspectives, and experiences, all while withholding judgment (Batt-Rawden *et al.*, 2013). In pharmacy education, students must navigate not only academic challenges but also the complexities of patient care, highlighting the role of empathy, as it may equip students with the emotional intelligence needed to excel in both academic and clinical settings (Moudatsou *et al.*, 2020).

The Accreditation Council for Pharmacy Education (ACPE) in the USA embeds patient-centred care in its doctoral pharmacy competencies and specifically emphasises empathy as a cornerstone for effective communication (Medina *et al.*, 2013). Although empathy is recognised as essential in healthcare, there is limited evidence in the literature regarding its

correlation with academic success. Some studies of medical students have shown no correlation between empathy and academic success (Austin *et al.*, 2005; Benabbas, 2016; Finn *et al.*, 2018), while others have shown a positive correlation (Hojat *et al.*, 2002; Jang *et al.*, 2010). Concerns about a decline in empathy through training have led to calls for educational improvements in healthcare education (Spiro, 2009; Nunes *et al.*, 2011; Ferri *et al.*, 2017; Shoemaker *et al.*, 2022).

Resilience and empathy can be nurtured through consistent practice and training, but the literature addressing how resilience and empathy may influence the academic achievements of pharmacy students is sparse. Research investigating the association between academic resilience, empathy, and academic success is scarce, particularly in pharmacy education. Understanding the relationship between academic resilience, empathy, and academic success within the context of pharmacy education would assist in shaping curriculum changes to enhance the likelihood of academic success and prepare students for patient-centred care.

This study aimed to evaluate academic resilience, general resilience, and empathy levels among undergraduate pharmacy students and identify possible correlations with demographic characteristics. It further sought to understand the interrelationships among these attributes and examine whether they influence pharmacy students' academic success.

Methods

Design

This study utilised a repeated cross-sectional design, spanning three consecutive academic years, involving undergraduate pharmacy students at the International Islamic University Malaysia (IIUM) enrolled in Term 1 during the academic years 2020/2021, 2021/2022, and 2022/2023.

Study population and sample size

The survey included all pharmacy students from years one to four enrolled in Term 1 over three academic years, totalling 1321 students. To ensure the study's reliability, a minimum sample size of 298 was calculated using the Raosoft equation (Raosoft, 2004). This calculation was adjusted for a 95% confidence level, a 5% margin of error, and an anticipated 50% response distribution.

Ethics approval

Ethical clearance was gathered from the IIUM Ethics Committee (Reference: IREC: 2020-120), and all participants gave informed consent for participation and access to their academic records. The study reporting followed the STROBE Guidelines (Cuschieri, 2019).

Survey instruments

An online survey was designed in three sections. Section 1 gathered demographic details, including name, student number, age, gender, current term, student type (domestic or international), cultural background, education history, and employment status. Section 2 used three psychometric tools, i.e., the Academic Pharmacy Resilience Scale-16 (APRS-16), the Brief Resilience Scale (BRS), and the Kiersma Chen Empathy Scale (KCES). Section 3 investigated students' experiences with changes to teaching during COVID-19. The findings were reported separately. The survey took 20-25 minutes to complete.

The Academic Pharmacy Resilience Scale-16 (APRS-16)

The APRS-16 assesses academic resilience among pharmacy students. It consists of four subscales, i.e. perseverance, reflective and adaptive help-seeking, negative impact and emotional response, and adaptive thinking processes. Scores range from 16 to 80, with higher scores indicating greater resilience. Scores on the APRS-16 are classified into three tiers of resilience levels, with the following score ranges: poor (16-39), moderate (40-59), and good (60-80) (Chisholm-Burns et al., 2019).

The Brief Resilience Scale (BRS)

The BRS has six items, split between positive and negative statements designed to assess resilience. Scores are summed from a six-point Likert scale, ranging from 'Strongly Disagree' to 'Strongly Agree.' Levels of resilience on the BRS are calculated via the average score (by dividing the sum of scores by six) and are classified based on the following score ranges: low resilience (scores 1.00-2.99), normal resilience (scores 3.00-4.30), and high resilience (scores 4.31-5.00). Higher scores indicate greater resilience (Smith et al., 2008; Smith et al., 2010).

The Kiersma-Chen Empathy-Scale (KCES)

This 15-item scale measures empathy in two domains: affective and cognitive. Higher scores (range 15-105) indicate more empathy. Items are rated from 1 to 7,

and four negatively phrased items require reverse coding (Kiersma et al., 2013).

Data collection procedures

Data were collected using an electronic survey distributed via Checkbox through email. Two reminders were sent out at one-week and two-week intervals following the initial invitation to enhance the response rate. The survey was accessible for one month. Researchers neither had direct involvement with the participants nor participated in their teaching. The survey's validity was confirmed through a pilot study involving expert academics and six final-year students from 2020/2021. The original APRS-16 scale was adapted to fit the local context; for instance, terms like 'PharmD' and 'residency' were replaced with 'Provisionally Registered Pharmacist (PRP) and BPharm.' No other changes were made to the validated questionnaires. Participation in the survey was voluntary, and no incentives were offered.

Data analysis

In Malaysia, academic performance is commonly assessed using the Cumulative Grade Point Average (CGPA), with most universities employing a 4-point grading scheme. For pharmacy students at IIUM, academic performance is measured using both the CGPA and term-specific GPA, sourced from the Faculty of Pharmacy's academic record databases for the current academic year in which the surveys were conducted. Two types of grade point averages are calculated: the term GPA and the CGPA. The term GPA is determined by dividing the total grade points earned by the number of credit hours for that semester. Students are expected to complete a set number of credit hours to graduate, each course's credit hours reflecting its academic load. GPA and CGPA categorise performance into three tiers: below 3.0, between 3.0 and 3.49, and above 3.5. A CGPA or GPA above 3.5 is considered indicative of high academic performance and qualifies students for the Dean's List at IIUM.

Permission was obtained to correlate questionnaire data with students' CGPAs and GPAs, and responses were matched using unique student ID numbers. Data verification and cleaning were performed, and missing data were handled through listwise deletion (Mirzaei et al., 2022). Only fully completed APRS-16, BRS, and KCES instruments were analysed to avoid non-response bias. Descriptive statistics were used, with significance levels set at $p < 0.05$. The Kolmogorov-Smirnov test indicated that the APRS-16, BRS, and KCES data were not normally distributed. As a result, non-parametric tests were employed for the analysis of these variables, and regression analysis was not conducted. All data were

imported into Microsoft Excel before being analysed using GraphPad Prism version 10 (GraphPad Software, California USA).

Results

Participants' characteristics

Between 2020 and 2022, 460 responses were collected, of which 359 were included in the final analysis. Incomplete surveys (82) and those where the student ID number did not match the academic records (19) were excluded. Six students who participated in the pilot testing were also excluded. No outliers were detected using the Grubbs' test.

Fewer than 5% of respondents participated multiple times across different years. A sensitivity analysis confirmed that their inclusion did not significantly alter the results (Delaney, 2013). Therefore, all responses were considered independent cross-sections for demographic analysis and year-to-year comparisons, and each set of repeat responses was treated as belonging to a separate cohort.

Demographic data, including name, student number, age, gender, current semester, student type, cultural background, previous education, and employment status were collected. Table I details the distribution and percentages of participants across different categories for each variable throughout the academic years.

Response rates across three academic years were as follows: 2020/2021 (27.9%), 2021/2022 (17.6%), and 2022/2023 (36.2%). Most participants were aged between 18-22 years (72.7%) and female (72.4%). Regarding the previous highest educational degree attained, 21.2% held a Bachelor's degree, and 78.8% had completed matriculation (equivalent to a diploma). The previous employment history showed that 3.6% were employed full-time, 27.0% were part-time, 76.6% had no working history, 5.6% were working part-time while studying, and 94.4% were not working. The GPA for Term 1 across the years was distributed as follows: less than 3.0 (25.1%), 3.0–3.49 (46.0%), and more than 3.5 (28.9%). Similarly, the CGPA for Term 1 across multiple years showed the following distributions: less than 3.0 (23.3%), 3.0–3.49 (50.1%), and more than 3.5 (26.6%).

Table I: Demographic characteristics

| Variables | Characteristics | Academic year | | | Overall |
|--|--------------------|--------------------|-------------------|--------------------|--------------------|
| | | 2020/2021 | 2021/2022 | 2022/2023 | |
| Total | | 131 (100) 27.9% | 76 (100) 17.6% | 152 (100) 36.2% | 359 (100) 27.3% |
| Year of study | Year 1 | 20 (15.3) | 21 (27.6) | 19 (12.5) | 60 (16.7) |
| | Year 2 | 15 (11.5) | 14 (18.4) | 48 (31.6) | 77 (21.5) |
| | Year 3 | 57 (43.5) | 22 (28.9) | 41 (27.0) | 120 (33.4) |
| | Year 4 | 39 (29.8) | 19 (25.0) | 44 (28.9) | 102 (28.4) |
| Age | 18-22 years | 97 (74.0) | 61 (80.3) | 103 (67.8) | 261 (72.7) |
| | 23-27 years | 34 (26.0) | 15 (19.7) | 49 (32.2) | 98 (27.3) |
| Gender | Female | 101 (77.1) | 47 (61.8) | 112 (73.7) | 260 (72.4) |
| | Male | 30 (22.9) | 29 (38.2) | 40 (26.3) | 99 (27.6) |
| Previous education | Bachelor's degree | 22 (16.8) | 8 (10.5) | 46 (30.3) | 76 (21.2) |
| | Matriculation | 109 (83.2) | 68 (89.5) | 106 (69.7) | 283 (78.8) |
| Previous employment history (pre-undergraduate) | Employed full-time | 5 (3.8) | 2 (2.6) | 6 (3.9) | 13 (3.6) |
| | Employed part-time | 26 (19.8) | 7 (9.2) | 38 (25.0) | 97 (27.0) |
| | No working history | 100 (76.3) | 67 (88.2) | 108 (71.1) | 275 (76.6) |
| | Employed part-time | 5 (3.8) | 3 (3.9) | 12 (7.9) | 20 (5.6) |
| | Not working | 126 (96.2) | 73 (96.1) | 140 (92.1) | 339 (94.4) |
| Grade point average (GPA) current semester | Less than 3.0 | 26 (19.8) | 28 (36.8) | 36 (23.7) | 90 (25.1) |
| | 3.0–3.49 | 76 (58.0) | 30 (39.5) | 59 (38.8) | 165 (46.0) |
| | More than 3.5 | 29 (22.2) | 18 (23.7) | 57 (37.5) | 104 (28.9) |
| Cumulative grade point average (CGPA) current semester | Less than 3.0 | 20 (15.3) | 23 (30.3) | 41 (27.0) | 84 (23.3) |
| | 3.0–3.49 | 83 (63.4) | 33 (43.4) | 64 (42.1) | 180 (50.1) |
| | More than 3.5 | 28 (21.3) | 20 (26.3) | 47 (30.9) | 95 (26.6) |

Levels of APRS-16, BRS and KCES*The Academic Pharmacy Resilience Scale-16*

The mean academic resilience score for pharmacy students in this sample, as measured by the APRS-16,

was 57.0 ± 7.8 , ranging from 31 to 77 (Table II). In this study, 2.2% (8 students) were categorised as having "poor" academic resilience, 60% (215 students) as "moderate", and 37.8% (136 students) as "good". These distributions are detailed in Table III.

Table II: APRS-16, BRS and KCES scores

| Academic year | 2020/2021 | 2021/2022 | 2022/2023 | Overall |
|---------------------------|---------------|---------------|---------------|---------------|
| N of students | 131 | 76 | 152 | 359 |
| APRS-16 scores | | | | |
| Mean (SD) | 55 (8.2) | 58 (5.4) | 58 (8.3) | 57 (7.8) |
| Median (Min-Max) | 56 (35-74) | 58 (45-71) | 57 (31-77) | 57 (31-77) |
| Interquartile range (IQR) | 49-61 | 55-61 | 52-63 | 52-62 |
| BRS scores | | | | |
| Mean (SD) | 3.1 (0.6) | 3.4 (0.57) | 3.2 (0.55) | 3.2 (0.58) |
| Median (Min-Max) | 3.2 (1.7-4.7) | 3.5 (2.3-4.5) | 3.2 (1.0-4.3) | 3.2 (1.0-4.7) |
| Interquartile range (IQR) | 2.7-3.5 | 2.9-3.8 | 2.7-4.3 | 2.8-3.7 |
| KCES scores | | | | |
| Mean (SD) | 78 (8.2) | 79 (6.3) | 80 (8.6) | 79.0 (8.1) |
| Median (Min-Max) | 77 (58-99) | 79 (64-92) | 80 (60-101) | 79 (58-101) |
| Interquartile range (IQR) | 72-83 | 75-83 | 74-86 | 74-84 |

Table III: APRS-16 interpretation

| Overall APRS-16 score | Interpretation | N (%) |
|-----------------------|------------------------------|------------|
| 16 - 39 | Poor academic resilience | 8 (2.2) |
| 40 - 59 | Moderate academic resilience | 215 (60.0) |
| 60 - 80 | Good academic resilience | 136 (37.8) |

The Brief Resilience Scale

The pharmacy students' resilience mean score, standard deviation, and median scores for the BRS are provided in Table IV. The pharmacy students in this sample had a mean resilience score of 3.2 ± 0.58 , with total scores ranging from 1.0 to 4.7. Students' levels of resilience were classified into low (115 participants, 32.0%, scores 1.00-2.99), normal (236 participants, 65.7%, scores 3.00-4.30), and high (8 participants, 2.23%, scores 4.31-5.00). These results are detailed in Table IV.

Table IV: BRS interpretation

| Overall BRS score | Interpretation | N (%) |
|-------------------|-------------------|------------|
| 1.00 – 2.99 | Low resilience | 115 (32.0) |
| 3.00 – 4.30 | Normal resilience | 236 (65.7) |
| 4.31 – 5.00 | High resilience | 8 (2.23) |

The Kiersma Chen Empathy Scale

The pharmacy students' mean score, standard deviation, and median scores for the KCES are provided in Table V. The total mean KCES score for pharmacy students was 79.0 ± 8.1 , with total scores ranging from 58 to 101.

Demographic influences on overall APRS-16, BRS, and KCES scores

Table V shows the influence of demographic factors on APRS-16, BRS, and KCES scores using non-parametric tests: Kruskal-Wallis and Mann-Whitney.

Table V: The influence of demographic factors on APRS-16, BRS, and KCES scores using Kruskal-Wallis and Mann-Whitney tests

| Characteristics | Overall APRS-16 score | Overall BRS score | Overall KCES score |
|----------------------------|-----------------------|-------------------|--------------------|
| Academic year | < 0.05* | < 0.001* | > 0.05* |
| Year of study | < 0.05* | > 0.05* | > 0.05* |
| Gender | > 0.05# | > 0.05# | < 0.001* |
| Age | > 0.05# | > 0.05# | > 0.05# |
| Cultural background | > 0.05* | > 0.05* | > 0.05* |
| Previous education | > 0.05# | > 0.05# | > 0.05# |
| Pre-employment history | < 0.05* | > 0.05* | > 0.05* |
| Current employment history | 0.1544# | > 0.05# | > 0.05# |

Significant *P*-values (< 0.05) are bolded.

* Kruskal-Wallis, # Mann-Whitney

APRS-16 scores, which measure academic resilience, demonstrated statistically significant differences in analysing them. The first of these factors is the academic year. Students in the academic years 2021/2022 and 2022/2023 had higher APRS-16 scores than those in the 2020/2021 academic year. This result was confirmed through a Kruskal-Wallis test, denoted as H(2), which yielded a value of 6.49 and a *p*-value less than 0.05, indicating statistical significance.

The second factor showing a statistically significant difference was the year of study. Specifically, students in Year 1 had higher APRS-16 scores than those in Years 3 and 4. The Kruskal-Wallis test for this comparison resulted in an H(3) value of 9.14 and a *p*-value less than 0.05, further confirming the statistical significance of these findings.

Lastly, pre-employment history also affected APRS-16 scores. Students with a history of full-time or part-time employment had higher scores than those without a work history. The Kruskal-Wallis test for this variable showed an H(2) value of 8.26, with a *p*-value less than 0.05, indicating that the difference is statistically significant. No significant differences were found in gender, age, previous education, or employment history.

For the BRS, a marked effect of different academic years (H(2) = 62.1, *p* < 0.0001) was observed, with the academic year 2021/2022 (median = 3.5) scoring significantly higher than both academic years of 2020/2021 and 2022/2023. No other statistically significant influences were detected in the year of study, age, gender, cultural background, previous education, or employment history.

The KCES analysis highlighted a significant gender difference in empathy scores (U = 9597, *p* < 0.001), with males (median = 80) scoring higher than females (median = 76). No significant differences in academic year, previous education, year of study, age, cultural background, and previous or current employment history related to overall KCES score.

Correlations between overall APRS-16, BRS, and KCES scores

Spearman rank correlation analysis revealed significant correlations between total APRS-16, BRS, and KCES scores (Table VI). A positive correlation was found between overall APRS-16 and BRS scores (*r* = 0.377, 95% CI: 0.282 to 0.465, *P* < 0.0001), suggesting that higher academic resilience was associated with greater resilience. Both the BRS (*r* = 0.144, 95% CI: 0.0379 to 0.247, *P* = 0.0063) and APRS-16 (*r* = 0.214, 95% CI: 0.109 to 0.313, *P* < 0.0001) correlated positively with the KCES-15, indicating that higher resilience was associated with higher levels of empathy.

Table VI: Correlation analysis results

| Correlation analysis | <i>P</i> -value | Confidence interval | Correlation coefficient (r) |
|----------------------|-----------------|---------------------|-----------------------------|
| APRS-16 vs. BRS | <0.0001 | 0.282 to 0.465 | 0.377 |
| APRS-16 vs. KCES-15 | <0.0001 | 0.109 to 0.313 | 0.214 |
| BRS vs. KCES-15 | < 0.05 | 0.0379 to 0.247 | 0.144 |

Significant *P*-values (< 0.05) are bolded.

Associations between academic success and overall APRS-16, BRS, and KCES scores

The study employed the Kruskal-Wallis test to examine potential associations in overall APRS-16, BRS, and KCES scores across different levels of academic achievement (CGPA and GPA). The results aimed to identify associations across these scales (Table VII). For the overall APRS-16 scale, a statistically significant variation was observed across CGPA and GPA ranges (*p* < 0.05). Specifically, higher median APRS-16 scores correlated with higher CGPA and GPA ranges. However, it is worth noting that the observed differences in median scores were relatively small, ranging from 56 to 58. It may not be educationally relevant or serve as a predictor for higher GPA scores. In contrast, no statistically significant differences were found for BRS scores across academic achievement categories (*p* > 0.05), suggesting that general resilience levels remained consistent regardless of academic

performance. Similarly, overall KCES scores also showed no significant differences across CGPA and GPA ranges ($p > 0.05$), indicating that empathy levels were not correlated with academic performance within this sample.

Table VII: CGPA and GPA ranges

| Variable | CGPA range (Median) | | | Kruskal-Wallis p -value |
|----------|---------------------|-------------|---------------|---------------------------|
| | Less than 3.0 | 3.0 to 3.49 | More than 3.5 | |
| APRS-16 | 57.0 | 57.0 | 58.0 | < 0.05 |
| BRS | 3.33 | 3.17 | 3.17 | > 0.05 |
| KCES | 79.5 | 79.0 | 78.0 | > 0.05 |
| Variable | GPA range (Median) | | | Kruskal-Wallis p -value |
| | Less than 3.0 | 3.0 to 3.49 | More than 3.5 | |
| APRS-16 | 56.0 | 57.0 | 58.0 | < 0.05 |
| BRS | 3.17 | 3.17 | 3.17 | > 0.05 |
| KCES | 79.0 | 80.0 | 79.0 | > 0.05 |

Significant P -values (< 0.05) are bolded

Discussion

This quantitative study had four primary objectives: (1) to investigate levels of academic resilience, general resilience, and empathy among pharmacy students at a Malaysian university using the APRS-16, BRS, and KCES scales for these measurements; (2) to analyse the influence of demographic characteristics on these attributes; (3) to explore the interrelationships among academic resilience, general resilience, and empathy; and (4) to investigate the influence of these attributes on academic success, as measured by CGPAs and GPAs.

Addressing the first objective, the study found that pharmacy students exhibited moderate levels of resilience across all cohorts. This finding is consistent with other research that has reported moderate academic resilience among healthcare students (Cassidy *et al.*, 2023). Longitudinal analysis over three academic years showed a slight increase in mean resilience scores, rising from 55 in 2020/2021 to 58 in subsequent years (Chen & Lucock, 2022). In comparison, the APRS-16 scores in this study were closely aligned with those of first-year pharmacy cohorts in the USA (Chisholm-Burns *et al.*, 2021).

The mean overall resilience score for the pharmacy students, as measured by the BRS, was 3.2 ± 0.58 , falling within the normal range according to the BRS manual. When compared to other studies using the same scale, the resilience scores from this sample were

higher than those of the undergraduate students in Spain and Brazil during the COVID-19 pandemic (Prado *et al.*, 2023; Ramos-Martín *et al.*, 2023). These scores also exceeded the average resilience scores observed among university students in Oman, which included pharmacy and medicine students (Al-Mahrouqi *et al.*, 2023). Such variations may be attributed to various factors, including the regional impact of COVID-19, academic pressures, cultural influences, and the level of institutional support available (Hammoudi Halat *et al.*, 2022).

The KCES measured the empathy levels of pharmacy students across the three academic years. The mean empathy scores remained stable despite the varied challenges and experiences each academic year presented, including the disruptions caused by the COVID-19 pandemic. This result could either indicate a robust educational framework within the pharmacy programme, effectively cultivating or protecting empathetic attitudes or imply that pharmacy students possess an inherent resilience in their levels of empathy, highly resistant to external challenges or environmental shifts.

Regarding the study's mean empathy score, which stood at 79.0 (SD 8.1), comparisons with other studies using the KCES yield mixed results, indicating again that psychometric scales are not an absolute measure, with results influenced by context (Chen *et al.*, 2015; Degeeter, 2016; Kaulback *et al.*, 2021).

The study's second objective was to explore the impact of demographic characteristics on academic resilience, general resilience, and empathy levels. An analysis of the relationship between these demographic factors and academic resilience scores, as measured by the APRS-16, yielded some noteworthy results. In line with previous research, academic resilience appeared to fluctuate based on the academic year and year of study (Cassidy *et al.*, 2023). The statistically significant but small differences observed between the 2021/2022 and 2022/2023 cohorts, when compared to the 2020/2021 cohort, suggest that by and large, the changes and challenges to learning due to the COVID-19 pandemic did not influence the levels of resilience from one cohort to the next (Thomas & Maree, 2022). This variability was not confined to cohorts; fluctuations across years of study further underscore the need to consider the impact of curricular elements on academic resilience (Price, 2023).

Students with prior work experience, whether full-time or part-time, exhibited higher academic resilience scores compared to those without such experience. This observation aligns with a study among pharmacy students in the USA, supporting the notion that work experience can bolster resilience and potentially

contribute to academic success (Camiel *et al.*, 2023). Conversely, no statistically significant differences were observed in academic resilience scores when considering other demographic variables such as gender, age, and current employment status. This finding suggests that these factors may not be critical determinants of academic resilience in this sample.

The study established a statistically significant difference between genders in empathy scores, as measured by the KCES, with males exhibiting higher levels compared to females. This result stands in contrast to a majority of previous studies that generally report higher empathy levels in females (Toussaint & Webb, 2005; Williams *et al.*, 2014; Berduzco-Torres *et al.*, 2021), although some research does support higher empathy levels in males (Ghazwani *et al.*, 2023). One potential explanation for this study's divergent findings could lie in the specific cultural or educational background and context of the students involved. Factors such as societal norms, educational curricula, or even the way empathy is socially constructed and valued in the given setting could contribute to these unexpected outcomes (Andersen *et al.*, 2020; Guadagni *et al.*, 2020).

The third objective of this study was to investigate the relationships between academic resilience, general resilience, and empathy. The findings revealed significant positive associations between these psychological constructs. Specifically, a positive correlation was observed between academic resilience and general resilience, confirming that students who exhibit academic resilience also tend to score higher on general resilience scales.

Furthermore, this study identified a positive correlation between academic resilience and empathy levels, as gauged by the APRS-16, BRS, and KCES scales. This finding is consistent with existing research, which posits a link between academic resilience and relevance for pharmacy education (Brown *et al.*, 2022). It suggests that interventions aimed at fostering academic resilience could also improve students' empathetic engagement, an essential competency for delivering effective patient-centred pharmaceutical care.

This study reveals a marked positive correlation between resilience and empathy among pharmacy students, corroborating existing research (Waddimba *et al.*, 2021). Supporting this nuanced perspective, another study found a positive correlation between changes in resilience and empathy (Brown *et al.*, 2022), echoing earlier research (Shapiro, 2011) and indicating that the relationship between these attributes may become more pronounced as individuals progress in their careers and gain further expertise. However, a parallel study with Australian pharmacy interns showed

no such correlation, warranting further investigation (Halimi *et al.*, 2023). One plausible explanation for this discrepancy may lie in the differing stages of professional development. Pharmacy students, primarily in an academic setting, may be more amenable to interventions aimed at fostering both resilience and empathy. This educational environment likely serves as fertile ground for introspection and personal growth, facilitating the synergistic development of these attributes.

Conversely, pharmacy interns, at the threshold of their professional careers, may face unique challenges that may independently influence their resilience and empathy levels. The rigours and expectations of a professional setting may bolster resilience without necessarily impacting empathy. Moreover, these attributes may still be in a formative stage at this juncture, complicating their interrelationship. External and geographical variables, such as the differences between Australia and Malaysia, add another layer of complexity. Factors like coping mechanisms and social support networks may modulate resilience, while empathy could be shaped by cognitive frameworks, social interactions, and cultural nuances. The heterogeneity of these variables could account for the inconsistent correlation observed across diverse settings.

Lastly, this study aimed to explore potential variations in APRS-16, BRS, and KCES scores across different levels of academic achievement. The analysis provided insights into the interrelationships between academic resilience, general resilience, and empathy, particularly as they relate to academic success, quantified by CGPA and GPA metrics. Importantly, this study's findings align with previous research, one of which, conducted at the same university, established a link between academic resilience and academic performance (Abubakar *et al.*, 2021; Camiel *et al.*, 2023). As levels of academic achievement increased, a corresponding rise in APRS-16 scores was observed, highlighting the role played by academic resilience in dealing with educational challenges, particularly pertinent in the context of the COVID-19 pandemic, where adaptability to unexpected educational disruptions has proven invaluable. Within the scope of pharmacy education, these results could inform curriculum and teaching strategies aimed at enhancing both academic resilience and empathetic patient care.

This study highlights the need for educational institutions to implement resilience-building initiatives aimed at better preparing students to navigate current and future academic challenges. Interestingly, the data revealed that while BRS and KCES scores did not exhibit significant statistical variations across different levels of

academic achievement, they were consistent with existing literature (Passi, 2014; Banerjee *et al.*, 2019). This result suggests that although academic resilience has a direct and measurable impact on academic outcomes, the roles of general resilience and empathy are more complex, influencing a broader array of facets in the student experience beyond mere academic performance. Consequently, these findings pinpoint academic resilience as a unique determinant of academic success, particularly within the scope of pharmacy education.

Limitations

Limitations of this study include the use of self-administered surveys, which are prone to response bias, as participants may overstate or understate answers to align with social expectations. The study's confinement to one university and limited participant pool restricts the generalisability of the findings. The non-anonymous survey design may have contributed to a lower participation rate. The longitudinal design, spanning three years, allowed for a deeper understanding of trends, particularly amidst the global pandemic. This perspective enhances the study's insights into academic resilience, resilience, and empathy within pharmacy education, contributing valuable longitudinal data to a field where such information may be scarce.

Conclusion

This study explored the academic resilience, resilience, and empathy among pharmacy students during the COVID-19 pandemic. Students displayed moderate academic resilience, with mean scores indicative of adaptability to pandemic-related challenges. A positive relationship was found between academic resilience and resilience and between academic resilience and empathy, highlighting their interconnected nature. Analysis over three academic years revealed trends possibly reflecting students' adaptation to altered learning environments and the prolonged stressors of the pandemic. Demographic characteristics, such as prior work experience, were found to influence resilience, but other factors like gender and age did not display significant variations. These findings highlight the correlation between academic resilience and academic achievements, while resilience and empathy have a broader impact, extending beyond academic grades. This finding underscores the need for fostering academic resilience as key to academic success, recognising the multifaceted roles of resilience and empathy in holistic student development and their

specific implications within the context of pharmacy education.

Conflict of interest

The authors declare no conflict of interest.

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