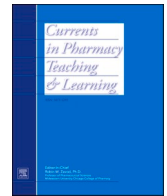




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Research Paper

Can learning experience in pharmacy school shape a competent leader? A cross-sectional study on leadership development, mental wellbeing, and Islamic values

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ABSTRACT

Background and purpose: The contemporary healthcare landscape dictates that pharmacists demonstrate comprehensive leadership competencies alongside advanced clinical expertise to navigate complex patient-care environments effectively. While academic curricula and extra-curricular engagements are recognized as primary mechanisms for cultivating these professional proficiencies, the psychological impact of assuming such roles—particularly the manifestation of academic burnout and stress—remains critically underexplored within the literature. This study investigates undergraduate pharmacy students' perceptions of how curricular frameworks and extracurricular activities contribute to leadership development, concurrently evaluating the mental wellbeing of student leaders and exploring the mitigating influence of culturally integrated ethical frameworks on psychological resilience.

Educational activity and setting: A cross-sectional study was conducted among undergraduate pharmacy students (Years 2 to 4) at the International Islamic University Malaysia (IIUM). The data collection instrument assessed leadership skills acquisition, perceptions of the pharmacy curriculum, the influence of extracurricular involvement, and eleven core leadership competencies. Mental well-being was assessed using the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS). Non-parametric statistical analyses, supplemented by the calculation of appropriate effect sizes, were employed to evaluate the data and determine practical significance. **Findings:** A total of 183 students responded; mostly female (63.9%) and in their final academic year (42.1%). A substantial majority (80.3%) affirmed that the formal academic curriculum facilitated their leadership development, although 53.8% advocated for the integration of dedicated, leadership-focused coursework. More than half of students reported moderate mental wellbeing (54.6%). Substantive differences in mental wellbeing were observed relative to the year of study, academic performance, intrinsic motivation to pursue pharmacy, and the volume of extracurricular participation, with these associations supported by moderate effect sizes.

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Discussion and summary: The findings elucidate the dual capacity of pharmacy curricula and extracurricular activities to foster essential leadership competencies while simultaneously highlighting the concurrent psychological demands placed on students. To optimize professional identity formation, pharmacy education programs must balance rigorous leadership training with robust, preemptive wellbeing support mechanisms. Furthermore, the integration of culturally specific paradigms, such as the Islamic concept of moderation (*wasatiyyah*), offers a valuable pedagogical framework for sustaining student resilience, preventing overcommitment, and navigating the complexities of modern pharmacy practice.

Introduction

The evolving landscape of contemporary healthcare necessitates that pharmacists possess comprehensive leadership competencies alongside advanced clinical expertise to effectively navigate complex patient-care environments. Structured academic programs featuring intentional leadership components have been proven to enhance students' leadership readiness, thereby preparing them well for advanced professional roles.¹ Nevertheless, persistent deficiencies in leadership skills among pharmacy graduates underscore the necessity for a more systematic integration of leadership development frameworks into core pharmacy curricula.² Internationally, the Center for the Advancement of Pharmacy Education (CAPE) educational outcomes highlight leadership as foundational expectation, requiring Doctor of Pharmacy graduates to demonstrate the ability to establish strategic objectives and effectively guide multidisciplinary teams toward shared goals.³ Locally, the International Islamic University Malaysia (IIUM) pharmacy curriculum adheres to the Standards for Undergraduate Pharmacy Program 2024 issued by the Pharmacy Board of Malaysia, which similarly mandates the development of professional leadership and collaborative competencies.⁴

Beyond formal didactic instruction, engagement in extracurricular activities —such as students organizations and volunteer initiatives— serves as a pivotal factor for leadership development. Active involvement in these unstructured environments provides experiential learning opportunities that foster essential interpersonal and organizational qualities, leading to elevated self-reported leadership acquisition and accelerated personal growth.^{5,6} However, pharmacy programs in Malaysia, taking the IIUM pharmacy curriculum as an example, often lack comprehensive evaluations of both the academic curriculum and extracurricular activities in fostering leadership skills among students.

Despite these benefits, the pursuit of leadership roles during pharmacy programs is not without challenges. Balancing academic responsibilities with leadership commitments can impact students' psychological health.⁷ Mental wellbeing, defined as an individual's ability to “experience positive emotions and psychological functioning, going beyond the mere absence or management of mental illness to encompass positive functioning in everyday life”,⁸ is frequently compromised by the dual demands of intensive academia and extracurricular commitments.^{7,9,10} Recent multi-center data indicate that the mental wellbeing of pharmacy students was lower than normative data reported for other higher education students.¹¹ Another study exploring factors affecting leadership in pharmacy students found that while leadership involvement contributes to skill development and professional identity, it frequently correlates with elevated stress levels and burnout, underscoring the urgent need for supportive measures from educational institutions.¹²

The IIUM pharmacy curriculum integrates traditional didactic lectures with contemporary active methods, including problem-based learning (PBL) and case-based learning (CBL). These collaborative frameworks push students to coordinate tasks and make decisions within a team setting. Additionally, experiential learning placements in industrial, hospital and community settings further require students to apply decision-making in a supervised, real-world conditions.

A distinguishing and innovative element of this curriculum is the deliberate integration of an “Islamic Input in Pharmacy” course. This unique course solidifies students' comprehension of how Islamic values and ethics intertwine with pharmacy practice, preparing them to become ethical and competent professionals. Specifically, it aims to mold future healthcare leaders who are truthful and responsible (*ameen*) in upholding patient care and safety, highly collaborative through mutual consultation (*shura*), and strive for excellence (*ihsan*) in providing healthcare services to patients.¹³

Despite the recognized importance of these elements, comprehensive evaluations assessing the synergistic impact of academic curricula, extracurricular activities, and integrated cultural frameworks on leadership skill acquisition remain scarce within the existing literature. Furthermore, the interplay between the assumption of leadership responsibilities and mental wellbeing among pharmacy students represents a critical void in current pedagogical research.¹⁴

To address these deficiencies, this cross-sectional study aims to evaluate the influence of the pharmacy curriculum and extracurricular activities on leadership skill development from the perspective of undergraduate pharmacy students at IIUM. Concurrently, it assesses the mental wellbeing of these students. By exploring the intersection of leadership development, mental health, and culturally specific ethical frameworks, this research seeks to provide actionable and evidence-based strategies that optimize leadership training in pharmacy education while safeguarding students' wellbeing.

Methodology

Study design and data collection

An online, self-administered survey was distributed by a junior investigator to undergraduate pharmacy students at IIUM. The

survey was administered via a Google Form and distributed through chat applications commonly used by students, mainly WhatsApp® and Telegram®. Specifically, the junior investigator sent direct individual messages to students via WhatsApp® and posted the link in established WhatsApp® and Telegram® groups. These groups are dedicated to each study year or subject and are managed by student representatives. Periodic reminders, twice weekly, were issued throughout the data collection period, which was carried out from January 2 to 16, 2025, coinciding with week 14 of the semester when most students were preparing for or sitting for final examinations. To ensure adequate participation and achieve the required sample size, the junior investigator made a brief verbal announcement at the conclusion of core student gatherings during the first week of data collection. This announcement served merely to notify students of the survey's availability in their respective communication channels, explicitly stating that participation was entirely voluntary.

Inclusion and exclusion criteria

The study targeted undergraduate pharmacy students enrolled in Years 2,3, and 4 of the pharmacy program. These students were actively engaged in face-to-face didactic learning sessions. First-year pharmacy students were excluded, as multiple survey questions were not relevant owing to their limited academic and extracurricular exposure.

Sample size

The targeted sample size was calculated using the online Raosoft® sample size calculator (<http://www.raosoft.com/samplesize.html>). The target population for this study was the cohort of 315 undergraduate pharmacy students enrolled in Years 2–4 at IIUM during the 2024/2025 academic year. Using this finite population, a presumed response distribution of 50%, a 95% confidence level, and a 5% margin of error, the minimum required sample size was 174 students.

Instrument structure, validity, and pilot testing

A structured 41-item survey was employed in this study, comprising four main parts.

Part 1 consisted of 11 items designed by Ali et al.¹⁵ to evaluate the participants' perceptions of the pharmacy curriculum's role and the influence of extracurricular involvement on leadership development. This section incorporated a combination of five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), dichotomous (Yes/No), and multiple-choice questions.

Part 2 included 18 statements measuring the participants' leadership development, aligned with the 11 leadership competencies as outlined by Janke et al.¹⁶ This section utilized a validated 18-item instrument from the literature by Tucci et al.,¹⁷ employing five-point Likert scale questions to capture self-reported perceptions of leadership competencies in three domains (see Appendix A in the supplement material). The questionnaire included both positively and negatively phrased items. This part aimed to evaluate the students' leadership skill development.

Part 3 implemented the validated seven-item Short Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS).⁸ This specific tool was selected as the primary psychological metric due to its robust psychometric properties, its brevity (comprising only seven items), and its extensive prior validation in assessing psychological functioning among university student populations. Moreover, it allows for the rapid assessment of positive mental health while reducing the risk of survey fatigue among participants undergoing intensive academic testing.⁸ All seven items were positively worded and rated on a five-point Likert scale (1 = None of the time to 5 = All of the time). The possible mental wellbeing scores for this survey range from 7 to 35.

Part 4 gathered sociodemographic information, including gender, current year of study, reasons for choosing the pharmacy program, academic performance, and the number of previous or current leadership roles held during their studies. Academic performance was self-reported and categorized using cumulative grade point average (CGPA) ranges consistent with the university's classification (for example, 'satisfactory' 2.50–2.99, 'good' 3.00–3.49, and 'excellent' ≥ 3.50).

Given that the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) has demonstrated robust psychometric properties across diverse populations, it was adopted without additional local psychometric testing in this exploratory single-center context. In contrast, Parts 1 and 2 required content validation because they combined items adapted from Ali et al.¹⁵ and Tucci et al.¹⁷ in a novel configuration. A panel of five experts from the Department of Pharmacy Practice at Kulliyyah (Faculty) of Pharmacy, IIUM, assessed the questionnaire's content validity. The item-level content validity index (I-CVI) was calculated for Parts 1 and 2 to determine their relevance and clarity, with a threshold of 0.7 as the minimum acceptable value. Items scoring below 0.7 for relevance were removed, while those falling below this threshold for clarity were revised based on expert recommendations. Following content validation, a pilot study was conducted with 15 eligible participants, ensuring representation from each year of study. These pilot participants were recruited via convenience sampling by approaching student representatives from each cohort. The internal consistency of the questionnaire was evaluated using Cronbach's alpha, yielding values of 0.718 for Part 1 and 0.781 for Part 2, both exceeding the threshold of 0.7. The responses collected from the pilot study participants were incorporated into the main data analysis, since the same questionnaire was used.

Statistical analysis

Data analysis was performed using the Statistical Package for the Social Sciences (IBM SPSS Statistics, Chicago, IL, USA) version 30.0 and Jamovi (Version 2.3).¹⁸ Descriptive statistics were used to summarize the Likert scale responses. The Mann-Whitney *U* test was applied to compare the variability between dichotomous categorical variables, while the Kruskal-Wallis test was applied to assess variations across categorical variables with more than two groups, as the data did not meet the assumption of normal distribution. To move beyond traditional probability testing and rigorously evaluate the practical significance of our findings within the context of pharmacy education, appropriate effect sizes were calculated and reported for all comparative analyses.¹⁹ Specifically, the rank-biserial correlation (r_{rb}) was utilized for Mann-Whitney *U* tests, and epsilon-squared (ϵ^2) was calculated for Kruskal-Wallis tests. The magnitude of these effect sizes was interpreted to determine the practical relevance of the observed differences. Moreover, the associations between sociodemographic characteristics and self-reported leadership competencies were assessed.

A priori, we planned to compare leadership competency domain scores across gender, year of study, CGPA category, number of extracurricular leadership activities, and leadership-role experience using the Mann-Whitney *U* or Kruskal-Wallis tests, as appropriate. We also planned to examine the associations between mental wellbeing scores and the same sociodemographic and academic variables. Nonparametric tests were chosen because the leadership and wellbeing scores did not meet the assumption of normality. Associations between sociodemographic characteristics and self-reported leadership competencies were thus assessed using these nonparametric tests.

Ethical approval

The IIUM Research Ethics Committee provided ethical approval for this study under approval number IREC (UG) 2024–098, complying with the 1964 Declaration of Helsinki and its later amendments. The online survey form included an informed consent section to acknowledge participants' voluntary participation in the study. Participants were informed of the confidentiality measures in place to ensure the anonymity of their responses, with data usage restricted solely to scientific research purposes.

Results

This study found that most IIUM pharmacy students perceived both the formal curriculum and extracurricular activities as contributing meaningfully to their leadership development, while still expressing a desire for more dedicated leadership-focused coursework. Leadership competencies were supported by problem-based and case-based learning, experiential placements, and co-curricular engagement, consistent with prior work in pharmacy education. At the same time, mental wellbeing levels clustered in the low-to-medium range for a substantial proportion of students, underscoring the need to integrate wellbeing support within leadership and professional development initiatives.

Sociodemographic characteristics

A total of 183 responses were received. Participants were mainly female ($n = 117$, 63.9%) in their final year of undergraduate study ($n = 77$, 42.1%). Approximately 27.9% ($n = 51$) of respondents based their decision to join the pharmacy program on their family or friends' recommendations, while 23.5% ($n = 43$) based it on their interest and passion. Almost half of the respondents ($n = 90$, 49.2%)

Table 1
Participants' sociodemographic.

Characteristic	N	%
Gender		
Male	66	36.1
Female	117	63.9
Year of study		
Year 2	59	32.2
Year 3	47	25.7
Year 4	77	42.1
The reason behind the choice of pharmacy program		
Interest/passion	43	23.5
Family/friends recommendation	51	27.9
Inspired by a pharmacist I know	30	16.4
Only available/reasonable choice	38	20.7
Others/no specific reason	21	11.5
Academic performance up to the previous semester		
Excellent (3.50–4.00)	36	19.7
Good (3.00–3.49)	90	49.2
Satisfactory (2.50–2.99)	57	31.1
Have held any leadership positions during pharmacy program		
Yes	96	52.5
No	87	47.5

had good academic performance (defined as a 'Good' CGPA between 3.00 and 3.49). More than half ($n = 96$, 52.5%) reported having held leadership positions. A detailed description of participants' sociodemographic data is provided in [Table 1](#).

Students' perceptions of activities' influence on leadership skill development

[Table 2](#) shows that pharmacy students held firm beliefs about leadership skills development alongside a recognition that curricular and extracurricular activities facilitate their leadership skills development. Most of the participants either strongly agreed or agreed that both leadership skills ($n = 128$, 70.3%) and their practice opportunities ($n = 127$, 69.8%) were delivered by the program curriculum. A substantial number of students acknowledged positive effects from the curriculum that enhance their leadership capabilities and perceived leadership abilities as vital for their professional development. Most students ($n = 106$, 58.2%) engaged in leadership development workshops or courses through curriculum-oriented self-improvement programs, and an additional 59.9% ($n = 109$) participated in such activities through extracurricular initiatives. More than three-fifths of the students believed that leadership development had resulted from participating in these activities.

The pharmacy curriculum contained appropriate leadership-focused courses according to 53.8% ($n = 98$) of respondents, though

Table 2

Participants' responses to the statements on the role and impact of pharmacy curriculum and extracurricular activities in KOP, IIUM on their leadership skills development.

Statement	Responses	N (%)
1. The pharmacy curriculum in IIUM is helping me or has helped me develop my leadership skills.	5 = Strongly agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly disagree	33 (18.1) 95 (52.2) 42 (23.1) 8 (4.4) 4 (2.2)
2. IIUM has provided (or is providing) adequate support and resources for the development of my leadership skills.	5 = Strongly agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly disagree	35 (19.2) 70 (38.5) 44 (24.2) 31 (17.0) 2 (1.1)
3. The pharmacy curriculum in IIUM has provided (or is providing) me with opportunities to practice my leadership skills.	5 = Strongly agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly disagree	44 (24.2) 83 (45.6) 37 (20.3) 12 (6.6) 6 (3.3)
4. Having strong leadership skills will make me more attractive to potential employers in my future career.	5 = Strongly agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly disagree	90 (49.5) 54 (29.7) 22 (12.1) 12 (6.6) 4 (2.2)
5. Leadership skills are important in my future career as a pharmacist.	5 = Strongly agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly disagree	100 (54.9) 63 (34.6) 10 (5.5) 6 (3.3) 3 (1.6)
6. Have you participated in any self-improvement courses or workshops related to leadership development as a part of the pharmacy curriculum in IIUM?	Yes No	106 (58.2) 76 (41.8)
7. Have you participated in any self-improvement courses or workshops related to leadership development as a part of the extracurricular activities in IIUM?	Yes No	109 (59.9) 73 (40.1)
8. How many extracurricular activities (e.g., organization/ volunteer/ club/ sports etc.) have you participated in during your pharmacy program in IIUM	None Less than 3 3–5 6–10 More than 10	13 (7.1) 47 (25.8) 53 (29.1) 42 (23.1) 27 (14.8)
9. Do you believe these self-improvement courses/ workshops related to leadership development and extracurricular activities have helped you develop leadership skills?	Yes No	115 (63.2) 67 (36.8)
10. Do you think the pharmacy curriculum in IIUM should include more courses or workshops focused on leadership development?	Yes No	84 (46.2) 98 (53.8)

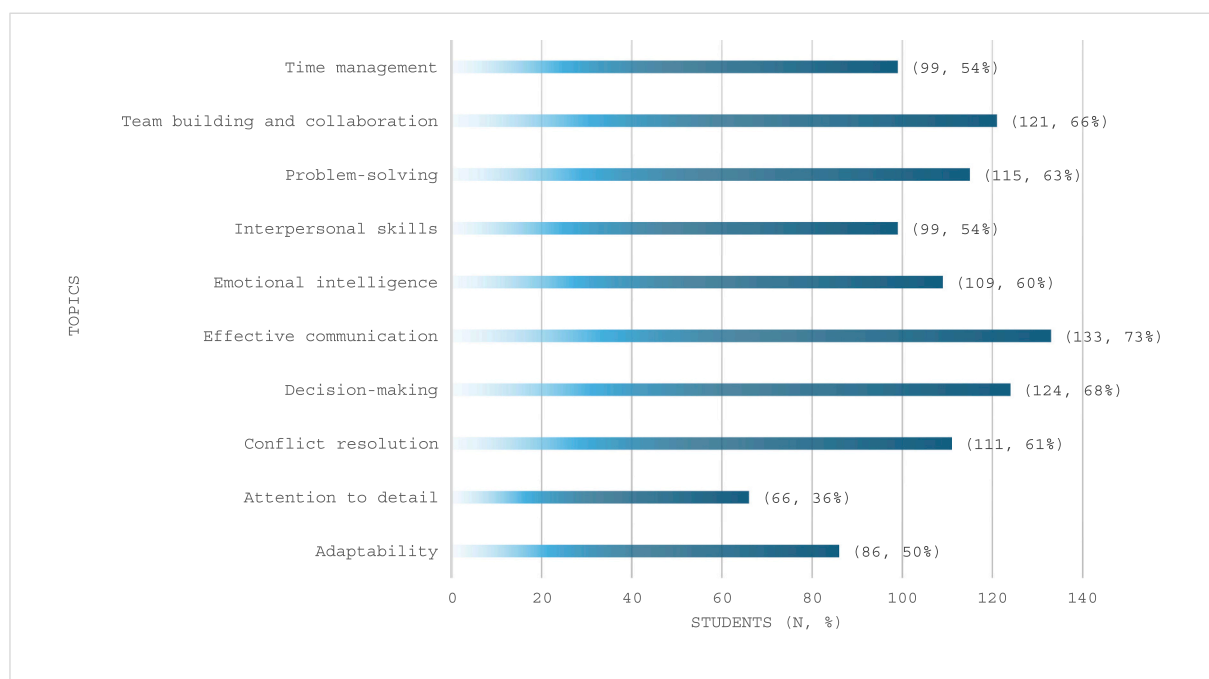


Fig. 1. Topics the students believed essential to be included in leadership courses/workshops in pharmacy (Statement 11).

46.2% ($n = 84$) indicated it needed more such courses. The specific leadership topics and their relative importance are presented in Fig. 1. Effective communication was deemed most important ($n = 133$, 73%), followed by decision-making ($n = 124$, 68%), while attention to detail was considered the least essential ($n = 66$, 36%).

Students' self-reported perceptions of leadership competencies

Substantive differences were observed between gender and both Leadership Knowledge and Personal Leadership Commitment, with female students exhibiting higher mean scores for both domains. However, exact non-parametric effect sizes for this variable were omitted due to anomalies in the software's raw mean rank data. A moderate practical association was observed between year of study and Leadership Knowledge supported by a medium epsilon-squared effect size ($\epsilon^2 = 0.081$), with fourth-year students presenting the highest mean ranks (108.45), followed by third-year (81.98) and second-year (75.47) students. Associations with Personal Leadership Commitment or Leadership Skills and Development were either negligible ($\epsilon^2 = 0.003$) or small ($\epsilon^2 = 0.013$), respectively. The mean rankings and effect sizes are presented in Table 3.

All three leadership competency domains were influenced by academic performance, demonstrating small practical effects ($\epsilon^2 = 0.022$, $\epsilon^2 = 0.029$, and $\epsilon^2 = 0.043$, respectively). Interestingly, students with satisfactory academic performance (2.50–2.99 CGPA) scored the highest mean ranks in Personal Leadership Commitment (101.78) and Leadership Skills and Development (94.84). Likewise, participation in extracurricular activities had a profound impact on leadership competencies. Students participating in less than three activities reported the highest mean ranks across all domains, while those involved in more than ten activities had the lowest mean ranks. This factor demonstrated a large practical effect on Personal Leadership Commitment ($\epsilon^2 = 0.152$) and medium effects on Leadership Knowledge ($\epsilon^2 = 0.060$) and Leadership Skills ($\epsilon^2 = 0.087$).

Table 3

Associations between sociodemographic characteristics and leadership competency domain scores (univariable Mann-Whitney U and Kruskal-Wallis tests).

Factor	Mean ranks (effect size)		
	Domain 1 Leadership knowledge	Domain 2 Personal leadership commitment	Domain 3 Leadership skills development
Gender (Mean Scores)			
Male	45.85	45.89	45.89
Female	46.16	46.11	46.11
	*	*	*
Have held any leadership positions during pharmacy program.			
Yes	93.20	92.92	93.56
No	89.80	90.08	89.44
r_{rb}	0.028	0.021	0.036
Year of study			
Year 2	75.47	89.11	81.95
Year 3	81.98	95.22	97.12
Year 4	108.45	88.50	91.78
ϵ^2	0.081	0.003	0.013
Academic performance			
Excellent (3.50–4.00)	87.36	75.91	77.03
Good (3.00–3.49)	80.61	90.76	106.15
Satisfactory (2.50–2.99)	98.56	101.78	94.84
ϵ^2	0.022	0.029	0.043
Participation in extracurricular activities			
None	99.93	95.90	98.41
Less than 3	110.30	118.67	106.70
3–5	84.23	99.21	98.67
6–10	81.80	71.99	76.04
More than 10	76.65	62.77	64.50
ϵ^2	0.060	0.152	0.087

The calculations above apply standard interpretation guidelines: for r_{rb} , < 0.1 is negligible, 0.1–0.3 is small, 0.3–0.5 is medium, and ≥ 0.5 is large. For ϵ^2 , ~ 0.01 is a small effect, ~ 0.06 is a medium effect, and ≥ 0.14 is a large effect.

* For the Gender variable, raw Mean Scores are reported rather than Mean Ranks. Because the raw data set was unavailable for re-extraction, specific non-parametric effect sizes for this single variable could not be reliably retroactively calculated.

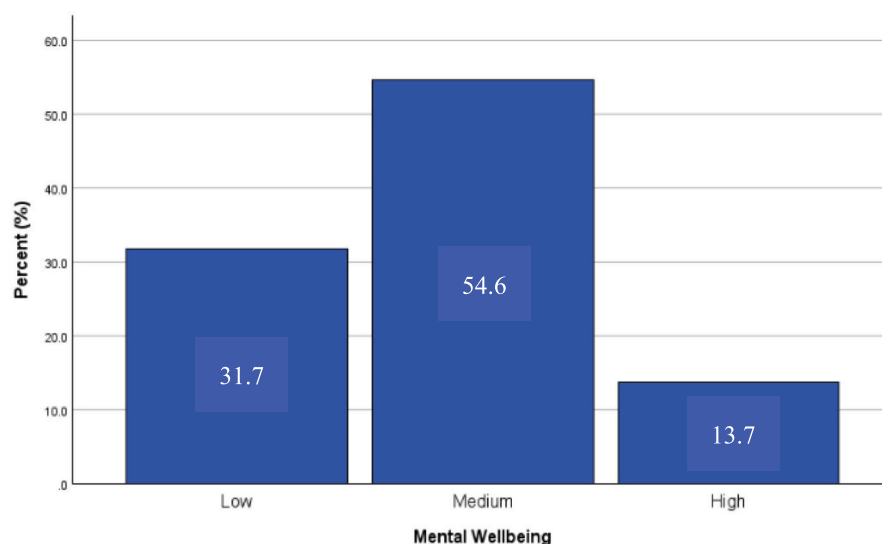


Fig. 2. Categories of the mental wellbeing levels among participants ($N = 183$).

Assessment of students' mental wellbeing

Overall mental wellbeing was categorized into low (scores 7–20), medium (scores 21–27), and high (scores 28–35) categories; a visual representation of this distribution is provided in Fig. 2. The overall assessment indicated that 54.6% ($n = 100$) of students reported medium mental wellbeing, whereas 31.7% ($n = 58$) exhibited low mental wellbeing, and only 13.7% ($n = 25$) were categorized as having high mental wellbeing.

Table 4

Responses to individual items of the mental wellbeing assessment tool, the 7-item the Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS).

Short mental wellbeing scale (the 7-item SWEMWBS)	N (%)				
	All of the time	Often	Some of the time	Rarely	None of the time
I've been feeling optimistic about the future.	33 (18)	54 (29.5)	67 (36.6)	26 (14.2)	3 (1.6)
I've been feeling useful.	7 (3.8)	42 (23)	66 (36.1)	48 (26.2)	20 (10.9)
I've been feeling relaxed.	7 (3.8)	52 (28.4)	53 (29.0)	59 (32.2)	12 (6.6)
I've been dealing with problems well.	12 (6.6)	54 (29.5)	82 (44.8)	28 (15.3)	7 (3.8)
I've been thinking clearly.	3 (1.6)	39 (21.3)	65 (35.5)	58 (31.7)	19 (9.8)
I've been feeling close to other people.	21 (11.5)	55 (30.1)	58 (31.7)	37 (20.2)	12 (6.6)
I've been able to make up my own mind about things.	4 (2.2)	33 (18)	53 (29)	66 (36.1)	27 (14.8)

Table 5

Factors associated with substantive differences in mental wellbeing scores.

Factor	Category with higher mental wellbeing scores (mean rank)	Category with lower mental wellbeing scores (mean rank)	p-value	Effect Size
Gender	Female (95.97)	Male (84.95)	0.094 ^a	$r_{rb} = 0.120$
Have held any leadership positions during pharmacy program	No (92.60)	Yes (91.45)	0.856 ^a	$r_{rb} = 0.013$
Year of study	Year 4 (104.36)	Year 2 (88.43)	<0.001 ^b	$\epsilon^2 = 0.047$
	Year 4 (104.36)	Year 3 (76.22)	<0.001	
Reason for choosing the pharmacy program	Interest/passion (106.1)	Inspired by a pharmacist I know (78.30)	<0.01	
	Interest/passion (106.1)	Only available/reasonable choice (80.07)	<0.01	
	Others/no specific reason (103.57)	Inspired by a pharmacist I know (78.30)	<0.05	
	Others/no specific reason (103.57)	Only available/reasonable choice (80.07)	<0.05	
Academic performance (CGPA)			<0.05 ^b	$\epsilon^2 = 0.022$
	Good (99.65)	Satisfactory (82.47)	<0.05	
	Good (99.65)	Excellent (87.96)	0.165	
Participation in extracurricular activities			<0.01 ^b	$\epsilon^2 = 0.072$
	< 3 (105.01)	3–5 (86.16)	<0.05	
	< 3 (105.01)	6–10 (75)	<0.001	
	> 10 (103.65)	6–10 (75)	<0.01	

^a Mann-Whitney test. Practical significance is reported using Rank-Biserial Correlation (r_{rb}).

^b Kruskal-Wallis test. Practical significance is reported using Epsilon-squared (ϵ^2); adjusted p-values are retained to indicate the probability of observation for pairwise comparisons.

Regarding specific SWEMWBS items (Table 4), about one in five ($n = 33$, 18%) students reported feeling optimistic “all the time,” while about one in three ($n = 121$, 66.1%) felt this way either “often” or “some of the time”. Similarly, more than a quarter ($n = 49$, 26.8%) of the students felt useful either consistently or often. Another quarter ($n = 48$, 26.2%) felt “rarely” useful, while 10.9% ($n = 20$) did not experience this feeling at all. Feelings of relaxation and independence were the two items showing the highest “rarely” condition responses by about a third of the sample each ($n = 59$, 32.2% and $n = 66$, 36.1%, respectively). Furthermore, only 6.6% ($n = 12$) of students consistently felt capable of dealing with problems, while 44.8% ($n = 82$) reported managing challenges “some of the time”. Although some students demonstrated resilience in problem-solving, 6.6% ($n = 12$) of the cohort consistently indicated profound difficulty in coping with academic stressors. However, 41.6% ($n = 76$) of students reported feeling close to others “all the time” or “often,” which is a notable subset of the cohort successfully maintaining positive social connections despite academic stress.

Key factors associated with mental wellbeing scores are summarized in Table 5. Meaningful differences in mental wellbeing scores were observed across different years of study ($\epsilon^2 = 0.047$, small effect), the intrinsic motivation to study pharmacy ($\epsilon^2 = 0.044$, small effect), academic performance ($\epsilon^2 = 0.022$, small effect), and participation in extracurricular activities ($\epsilon^2 = 0.072$, medium effect).

Pairwise comparisons revealed that year 4 students exhibited higher mental wellbeing compared to year 2 and 3 students. Students who chose pharmacy out of interest and passion reported higher mental wellbeing compared to those who cited other reasons. Students with a “Good” CGPA (3.00–3.49) had higher mental wellbeing only when compared to those with a “Satisfactory” CGPA (2.50–2.99). Regarding the number of leadership activities, the best mental wellbeing status was attributed to students participating in fewer than three extracurricular activities.

It is worth noting that holding a formal leadership position yielded negligible effect sizes on both leadership domain scores (r_{rb}

ranging from 0.028 to 0.036) and mental wellbeing scores ($r_{tb} = 0.013$), indicating no practical difference between students who had held at least one leadership position and those who had not.

Discussion

The current report highlights the association between curricular and extracurricular activities on one side and building leadership character and mental wellbeing on the other side from the perspective of pharmacy students. The sample had a higher representation of final-year females, which reflects the common trend of gender distribution in undergraduate pharmacy programs.

Students appreciated the emphasis on leadership character-building—which is currently embedded transversally across problem-based learning cases and experiential clerkships rather than delivered as a standalone, dedicated course—but expressed a need for greater attention to some specialized topics such as effective communication, conflict resolution, and strategic decision-making. Reflecting on the current curriculum, students generally valued the existing leadership development component; however, a substantial portion of the cohort (46.2%) indicated a desire for deeper, dedicated didactic training to further enhance their professional competencies.

PBL, CBL, and experiential learning are perceived by students as important components of leadership development within the pharmacy curriculum, which may foster interpersonal skills, effective critical thinking and team building.²⁰ The global trend in pharmacy education focuses on developing leadership competence because pharmacists need these abilities to advance their patient care roles.⁸ Any additional activities should be accompanied by relevant constructive assessments and feedback from both educators and peers.

Beyond the structured pharmacy curriculum, students' leadership skill development is associated with their involvement in various extracurricular activities.⁴ Engagement in a manageable volume of varied extracurricular initiatives provides students with experiential opportunities to cultivate interpersonal competencies relevant to the pharmacy profession. Enhancing extracurricular leadership opportunities, through external collaboration, for example, may help pharmacy students develop skills and competencies relevant to their future careers and the pharmacy profession.

Analyzing the relationship between the three domains of leadership competencies and sociodemographic characteristics revealed interesting findings. The calculation of effect sizes revealed that formal leadership roles alone do not guarantee higher self-perceived leadership competencies (yielding negligible practical effects). Several studies suggest that having a formal leadership role is not a reliable determinant of an individual's leadership abilities and might even lead to overestimation.²¹ Furthermore, leadership knowledge demonstrated a medium practical effect ($\epsilon^2 = 0.081$) relative to the year of study, being highest among fourth-year students, which suggests that the pharmacy curriculum actively increases leadership understanding over time.¹⁷

Contrary to expectations, students with lower academic performance exhibited higher leadership commitment and skills, which supports the idea that leadership capabilities extend beyond academic excellence.²² This may occur, potentially because these students are more motivated to develop leadership skills to compensate for their academic performance through extracurricular activities.^{1,12}

The analysis of effect sizes revealed that extracurricular volume has a profound impact on leadership and wellbeing. While an initial positive association exists, excessive involvement (more than 10 activities) demonstrated a large negative practical effect on Personal Leadership Commitment ($\epsilon^2 = 0.152$) and a medium negative effect on mental wellbeing ($\epsilon^2 = 0.072$). This is consistent with published reports stating that overcommitment to extracurricular activities negatively impacts leadership growth due to time constraints, academic pressures, and mental fatigue.²² A balanced approach to extracurricular involvement yields the greatest developmental benefit.

Responses to the SWEMWBS items clustered mainly in the “some of the time” or “rarely” categories, underscoring the need for targeted interventions to support students' mental health. A substantial number of students reported “rarely” being able to think clearly, which could likely be attributed to the ambient pressures of quizzes and assignments at the time of data collection. The prevalence of low-to-medium mental wellbeing aligns with studies indicating that mental health challenges are common among pharmacy students,²³ including another Malaysian study that reported similar findings within this demographic.²⁴ Given the concerning levels of mental wellbeing, re-evaluating and improving the support and counseling services provided by IIUM is warranted.^{8,25,26}

The higher mental wellbeing scores of final-year students may be explained by reduced didactic distress owing to fewer traditional courses and more placements. Therefore, the administration could focus more on supporting third-year students by adjusting the curriculum to reduce academic pressures.²⁷ Further, the intrinsic motivation to study pharmacy yielded a meaningful impact on students' mental wellbeing. Students driven by genuine interest and passion were more likely to be engaged and resilient. This aligns with self-determination theory, which posits that autonomy and intrinsic motivation are crucial for psychological wellbeing.²⁸ One tactic to solidify passion is to emphasize career counseling early in the curriculum, ensuring students have a realistic understanding of the profession.

The observed medium effect size ($\epsilon^2 = 0.072$) linking extracurricular participation volume to mental wellbeing levels provides strong empirical support for the Islamic concept of *wasatiyyah* (moderation). According to a definition by Sheikh Yusuf al-Qardhawi, *wasatiyyah* promotes a middle ground, balancing materialism and spirituality, reality and imagination, reason and emotion, individuality and community, and change and consistency, while also forbidding extremism.²⁹ In the context of professional identity formation, *wasatiyyah* provides a highly relevant pedagogical framework (Table 6), reminding students that the pursuit of leadership and academic excellence should not compromise health or relationships.

The current findings should be interpreted with some limitations in mind. First, the cross-sectional design restricts the ability to establish causal relationships. Additionally, being a single-center study restricts generalizability to all Malaysian pharmacy students.

Table 6

Alignment of Core Islamic Principles with Pharmacy Leadership Pedagogy and Assessment Domains.

Islamic Concept	Linguistic Definition	Pedagogical Application in Pharmacy Leadership	Relevant Survey Domain
Ameen	Trustworthy, truthful, and reliable.	Fosters strict accountability in patient care and adherence to ethical clinical guidelines.	Personal Leadership Commitment
Shura	Mutual consultation and collaborative deliberation	Encourages active listening, teamwork, and interprofessional healthcare communication.	Leadership Skills and Development
Ihsan	Excellence and the pursuit of perfection in one's work	Drives continuous quality improvement and the provision of optimal, patient-centered services	Leadership Knowledge
Wasatiyyah	Moderation, balance, and the avoidance of extremes.	Promotes a sustainable work-life balance, mitigating academic burnout and preventing extracurricular overcommitment.	Mental Wellbeing (SWEMWBS)

That said, the study is exploratory in nature and aims to lay the groundwork for further expanded, comprehensive research. The reliance on self-reported data may be subject to reporting bias. Because some students, particularly in Year 2, had not yet completed all leadership-related courses, their perceptions of the curriculum's leadership component may be based on partial exposure. In addition, nearly half of the participants had not held formal leadership positions, which limits inferences about how leadership-role experience shapes competencies and wellbeing. Finally, the integration of the Islamic concept of *wasatiyyah* in interpreting our findings is conceptual only; we did not include items directly assessing this construct.

Conclusion

This investigation elucidates the dual role of formal academic curricula and extracurricular activities in cultivating leadership competencies among undergraduate pharmacy students at IIUM. The data underscore that while engagement in student organizations and experiential learning environments critically facilitates professional identity formation, it concurrently exposes students to elevated psychological stressors. Consequently, it is imperative that institutional stakeholders implement robust, preventive mental health strategies to sustain student wellbeing. A critical observation derived from this study is the relevance of culturally integrated paradigms, specifically the Islamic concept of *wasatiyyah* (moderation). The application of *wasatiyyah* provides a highly viable and culturally resonant theoretical framework for students to navigate the intense pressures of leadership development, advocating for the avoidance of extremes and the pursuit of a sustainable work-life balance.

To further advance the scholarship of teaching and learning in this domain, future research should assess the longitudinal efficacy of specific curricular interventions and explore the quantitative impact of structured mentorship models on leadership acquisition. By systematically addressing the intersection of professional competency development, psychological resilience, and culturally specific ethical frameworks, pharmacy education programs can more effectively prepare graduates to become adaptive, well-rounded, and empathetic leaders within increasingly complex global healthcare systems.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used AI tools, including Perplexity AI, Nature Research Assistant, QuillBot and Gemini to improve readability and language, structural formatting, and refining the presentation of statistical data. After using these tools, the authors have carefully reviewed and edited the content generated to ensure accuracy and consistency with the study findings and ethical guidelines. The authors take full responsibility for the content of the publication.

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Declaration of competing interest

The authors declare that the study was conducted in the absence of any commercial, financial or personal relationships that could be construed as a potential conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cptl.2026.102795>.

Data availability

The data that support the findings of this study are not openly available due to sensitivity reasons and are available from the corresponding author upon reasonable request. Data are located in controlled access data storage at the International Islamic University Malaysia.

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