

1 **Title A Comparative Cross-Sectional Study on the Prevalence of Impostor Phenomenon in Medical and Non-**
2 **Medical Students of Lahore City, Pakistan**

3
4 **Article type: Original Article**

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34 **Acknowledgment:** We would like to extend our gratitude to Dr. Ashraf Chaudhary for providing us with his expert insight
35 when required. We would like to thank Ms. Bushra Amin, the biostatistician of the department, for her help. We would also
36 like to acknowledge our team members, Abdullah Ahmed, Mahrukh Riaz, Mahtab Asif, Mahnoor Fatima, and Maryam Sabir
37 for supporting us in completing our research article as well as the participants who voluntarily shared their responses.
38
39

1 **Compliance with ethical standards:** All the work in this manuscript has been conducted after proper approval from the
2 ethical committee of CMH Lahore Medical and Dental College. The approval by the institutional review board (IRB has been
3 attached
4

5 **Authors Contribution Statement:**

6 ● Conceptualization: LR.,AL.,MN.,MT.,ZO. Methodology: LR.,AL.,MN.,MT.,ZO Software: LR., AL.,MN.,MT. Formal
7 Analysis: LR .AL.,MN.,ZO Data Curation: LR., AL.,MN.,MT. Investigation: LR.AL.,MN.,MT. Writing – Original Draft:
8 LR.,AL.,MN.,MT. Writing – Review & Editing: LR.,AL.,MN. Visualization:LR.,AL.,MN.,MT.,ZO Supervision:
9 LR.,AL.,MN.,ZO Project Administration: LR., AL.,MN.
10
11
12

13 **Manuscript word count:** 3719

14 **Abstract word count:** 205

15
16 **Number of Figures and Tables:** One figure and two tables
17

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24 **Discussion Points:**

- 25 ● What is the Impostor Phenomenon?
26●
27 ● The prevalence of Impostor Phenomenon among medical and non-medical students and how it may differ among
28 males and females.
29●
30 ● To bring awareness among students and educators about the extent of the phenomenon and its impact on mental
31 health.
32
33 ● The abstract of this article was presented at the IJMS World Conference of Medical Student Research on 26th
34 October2023
35
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1 **Dates**

2 Submission: 11/30/2023

3 Revisions: 12/20/2023, 07/03/2023, 10/30/2024

4 Responses: 01/21/2024, 07/19/2024, 11/03/2024

5 Acceptance: 02/28/2025

6 Publication: 03/03/2025

7

8 **Editors**

9 Associate Editor/Editor: Francisco J. Bonilla-Escobar

10 Student Editors: David Morcos, Rachna Shekhar & Shane Darbar

11 Copyeditor: Leah Komer

12 Proofreader:

13 Layout Editor:

14

15 **Publisher's Disclosure:** *This is a PDF file of an unedited manuscript that has been accepted for publication. As a service*
16 *to our readers and authors we are providing this early version of the manuscript. The manuscript will undergo copyediting,*
17 *typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the*
18 *production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the*
19 *journal pertain.*

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ABSTRACT.**Background:**

The Impostor Phenomenon (IP) is a psychological pattern characterized by feelings of inadequacy and self-doubt despite evident competence. This study aims to compare the prevalence of Impostor Phenomenon among medical and non-medical students in Lahore, Pakistan and to compare the distribution between genders.

Methods:

A cross-sectional study involving a total of 242 medical and non-medical students was conducted using the validated Clance Impostor Phenomenon (CIP) scale that ranges between 20 to 100 and includes scores categorised as ≤ 40 (mild), 41-60 (Moderate), 61-80 (Frequent), ≥ 81 (Severe). The data was collected between February 2023 to April 2023. It was analyzed using descriptive statistics and unpaired t-tests as well as multivariate linear regression model in SPSS version-26.

Results:

IP was prevalent among both medical and non-medical students, with significantly higher scores among non-medical students (mean CIP score: of 67.08 ± 13.704) compared to medical students (mean CIP score: 58.36 ± 11.413). It was noted that although IP is prevalent in both genders, it is much more significant in females as females exhibited higher IP scores than males (p -value < 0.05). The multivariate linear regression model showed significant dependency of the total CIP scores on the variables, university and gender, with the p -value being less than 0.05

Conclusion:

In conclusion, this study underscores the high prevalence of IP among medical and non-medical students and highlights the need for targeted interventions. It also explores the effect of both genders on having feelings of impostor-ism.

Key Words: mental health, Impostor Phenomenon/Syndrome, medical students, non-medical students, prevalence, gender differences

1 **INTRODUCTION.**

2 The Impostor Phenomenon (IP), known as imposter syndrome commonly, is an intriguing psychological pattern affecting
3 people across various ages, genders, and professions. It leads individuals to doubt their abilities and feel inadequate,
4 despite clear evidence and recognition of their skills and achievements. This often happens to high achievers who believe
5 they have misled others about their true capabilities.^{1,2}

6
7 The term was first brought to attention in the 1970s by psychologists Pauline Rose Clance and Suzanne Imes, who
8 observed it frequently in high-achieving women.³ Over time, it has become evident that this experience is not limited
9 by gender, impacting individuals of various backgrounds and professions.⁴

10
11 It can manifest as a nagging feeling of being a charlatan in one's field, a dread of inevitable failure, or an excessive
12 tendency toward self-criticism. These feelings may cause individuals to minimize their achievements, shy away from
13 taking risks, and feel out of place in their professional environment.⁵ The impact of this phenomenon can be substantial,
14 leading to reduced job satisfaction, burnout, and even career stagnation.⁶ Nevertheless, there are strategies that both
15 individuals and organizations can implement to address this and assist those affected by it.⁷

16
17 Since 1978, over twelve hundred studies have been published on the Impostor Phenomenon, with 80% of these emerging in recent
18 years. Efforts have been made to educate the public on the topic, with articles from sources like Harvard Business Review shedding
19 light on the psychological aspects of the phenomenon.⁸ These wide variety of clinical research has led to the development of various
20 scales of measurement. The first scale was introduced by Joan Carol Harvey in 1981, a fourteen-item scale.⁸ Following this, the Clance
21 Impostor Phenomenon Scale (CIPS) was developed by Pauline Rose Clance in 1985, to improve the quality of detecting the impostor
22 phenomenon.⁸ It was made to clinically observe attributes or feelings not marked by the Harvey Impostor Scale. This scale consists
23 of twenty questions, each rated on a 5-point Likert scale, resulting in a score ranging from 20 to 100. A higher score indicates stronger
24 imposter feelings, while a score below 40 suggests a negative test. Hence this scale acknowledges the fear of evaluation and feeling
25 of low self-esteem. It is the most commonly used measure by researchers.⁹

26
27 Medical students in general are noted to have a higher prevalence of cerebral distress than their peers in other
28 departments. The feeling of detachment, peer pressure, academic stress, financial problems, time constraints and the
29 insight of "implausible expectations" cause anxiety, depression and suicidal thoughts among the students.¹⁰ This leads to
30 the feeling of not being able to perform well as physicians while also affecting their mental health i.e. increasing anxiety,
31 depression and low self-esteem eventually causing them to quit their profession.¹¹ This affects the patient's care
32 negatively.

33
34 Many individuals working in non-medical fields also experience similar emotions. The belief that the Impostor Phenomenon (IP)
35 is more prevalent in computer science than in other fields remains unvalidated. In Rosenstein's 2020 research, over half
36 of the respondents met the diagnostic criteria for imposter phenomenon, with a higher occurrence among female
37 computer science students compared to males.¹² Computer science students also showed significantly more imposter
38 phenomenon feelings than students in other fields and even health professions.¹² Although it might be assumed that law
39 students undergo an intense competition and stress, not much research has been performed. In a compelling survey, it

1 was discovered that an impressive sixty-three percent of first-year law students exerted themselves beyond their limits to
2 meet the high expectations set by their law professors.¹³

3
4 As the world gets competitive, the desire to ace every challenge put forward to the students by the institutes creates an
5 inevitable pressure. Students of every field try to do better than the others yet not everyone succeeds. Feelings of being
6 an outcast arise; not being able to do well as expected or having burnouts produces the phenomenon of 'imposter-ism'
7 regardless of which field they are in.

8
9 Until now, extensive research has been conducted, exploring the frequency of the Impostor Phenomenon amongst students
10 and other professionals.¹⁴⁻¹⁶ However, there has yet to be a study on a comparison between medical and non-medical fields.
11 Hence, this research aims to give spotlight to the differences in both fields and how individuals from either might develop
12 feelings of fraudulence. This reading may further explore the causes and consequences of impostor phenomenon, related
13 to either field; helping in figuring out practical strategies for understanding and overcoming it.
14

1 **METHODS**

2
3 This comparative cross-sectional study was conducted from February to April 2023 among medical students from CMH Lahore
4 Medical and Dental College, and non-medical students from Lahore University of Management Sciences (LUMS) with the aim to
5 compare the prevalence of imposter phenomenon between them.

6
7 This study involved a total of 242 students (121 medical students and 121 non-medical students). The inclusion criteria encompassed
8 both medical and non-medical students from the two universities. Non-Medical includes courses primarily provided by the LUMS
9 institute such as computer science, law, business, etc. Study participants included male and female students, aged 18-27 years, from all
10 academic years, ranging from first to fifth year. Those who were willing to participate and provide informed consent were considered
11 eligible, while who were not enrolled in either institute or were unwilling to give consent were excluded from the study.

12
13 The sample size was calculated by using the standard formulas for comparative studies which involve the comparison of two
14 independent groups using unpaired t-test. With a confidence interval of 95%, the study power was set at 80% and the standard deviation
15 was taken as 1.18 and then the critical Z-scores were added to the formula to calculate the sample size (n). Convenience sampling was
16 employed due to the broad scope of the study involving two universities having near 1000 or more students enrolled, meaning
17 participants were selected based on their availability and willingness to take part in the study. Despite this, efforts were made to address
18 any bias by ensuring that all potential respondents had an equal chance to participate, clearly defining the inclusion criteria and by
19 ensuring the adequacy of sample size for statistical analysis.

20
21 Approval for the study, Case #. 621 / ERC/ CMH / LMC was obtained from the Institutional Review Board of CMH LMC on 4th
22 February 2023, ensuring compliance with all relevant ethical guidelines. Before participation, all participants were provided with
23 information about the purpose and procedure of the study. Written informed consent was taken from all participants, ensuring voluntary
24 participation. Participants were informed of their right to withdraw at any time. Data was collected using anonymous questionnaires to
25 prevent any identifiable information and anonymized data were used for analysis.

26
27 The questionnaires were self-administered and distributed to the medical and non-medical students during their lectures' time. The
28 students filled out the questionnaire in about ten minutes. The questionnaire comprised of sections on consent, socio-demographic
29 characteristics and questions entailed in the Clance Impostor Phenomenon Scale (CIPS).

30
31 The Clance Impostor Phenomenon Scale (CIPS) is a validated survey, and it was used after proper permission and agreement.¹⁷ The
32 questions encapsulate the different presentations of imposter phenomenon and the participants were to answer with the rate at which
33 they had faced it themselves before the study was conducted, during their time in their respective courses. The reliability of the
34 questionnaire was pretested again in the context of a comparative study using a pilot study for the duration of a week, on a sample size
35 of twenty participants and it was found to be 88.9%. Based on the results of the pilot study, the scale was adapted as such without any
36 modifications.

37
38 The responses from which the subjects could choose included: 'not at all true', 'rarely', 'sometimes', 'often' and 'very true'. A binary
39 recording scheme was used to appraise the answers. According to this technique, a response of one is for not at all true and a five is for
40 very true. The variable age was divided evenly into three groups; 18-20, 21-23 and 24-27. The ranges were as such to incorporate
41 maximum number of students.

Comentado [FJBE1]: Describe further, how was this convenience?

Comentado [MOU2]:

Comentado [MOU3]:

Comentado [MOU4]: Convenience sampling was employed, meaning participants were selected based on their availability and willingness to take part in the study. Despite this non-random selection method, efforts were made to ensure that all potential respondents had an equal chance to participate.

1
2 Responses were scored on a Likert scale and the total score of each participant was obtained by adding their chosen options in each
3 question. As there were twenty questions, therefore, a minimum of 20 and a maximum of 100 score was to be expected. Then the mean
4 of the scores were calculated for each group; medical, non-medical as well for both males and females. Then these were categorized
5 into four levels according to the Clance Impostor Phenomenon Scale (CIPS).

- 6 • ≤ 40 total score (Mild IP)
- 7 • 41-60 total score (Moderate IP)
- 8 • 61-80 total score (Frequent IP characteristics)
- 9 • ≥ 81 total score (Severe IP)

10 This classification helped determine the level of the impostor characteristics an individual, or individuals in a certain group felt.

11
12 Data analysis was performed using SPSS version 26. Descriptive statistics, including means and standard deviations, were used to
13 summarize demographic data. The mean score of total CIP unpaired t-test was performed to compare the mean of CIP scores between
14 the two universities as well as between both genders. To further establish the dependency of the different total scores obtained on the
15 aforementioned groups, a linear regression model was used. The significance level was set p-value <0.05 . Prior to conducting the t-
16 tests, assumptions of normality and homogeneity of variances were checked. The decision to use a t-test was based on satisfaction of
17 these assumptions and if the assumptions had been violated, alternative tests such as non-parametric tests would have been considered.

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1 **RESULTS.**

2
3 A total of 242 responses were collected, with 121 from each university. Maximum individuals were aged between the range 21-23 with
4 around 47.1% of the total. Male respondents accounted for 57.4% of the total, while females made up 42.6%. The highest response
5 rates were from first-year (36.8%) and fourth-year students (34.7%), with only 2.1% of responses coming from fifth-year students. Table
6 1 provides detailed frequencies and percentages of the demographic data.

7
8 **Table 1. Demographic Characteristics of Medical and Non-Medical Study Participants by University and**
9 **Gender**

Demographics	Frequency	Percentage
Age		
18-20	113	46.7
21-23	114	47.1
24-27	15	6.2
Gender		
Male	139	57.4
Female	103	42.6
University		
CMH	121	50.0
LUMS	121	50.0
Year of Study		
First	89	36.8
Second	23	9.5
Third	41	16.9
Fourth	84	34.7
Fifth	5	2.1

10 (CMH= CMH Medical College representing medical students, LUMS= LUMS University representing non-medical students)

11
12
13 Table 2 compares the mean total Clance Impostor Phenomenon Score (CIPS) of CMH and LUMS, calculated from the respondents'
14 answers and analyzed using unpaired t-test. The total is the score achieved from the CIP scale calculated by adding all the answers to
15 the twenty-questioned CIPS. Afterwards which a mean was calculated for each institute to aid in comparison. Later, the means were
16 compared with the interpretation breakdown provided by the CIP scale itself; score less than equal to 40 has few imposter phenomenon
17 characteristics, 41 to 60 has moderate IP experience, 61 to 80 means the respondent had experienced the phenomenon frequently, and a
18 score higher than 80 means having intense imposter phenomenon. The total score shows significance when comparing both colleges at
19 p-value <0.05 with LUMS having a higher mean value of 67.08 (±13.704), and CMH having 58.36 (±11.413). This suggests that the
20 LUMS total score lies in the third category (61 to 80) of frequent imposter phenomenon characteristics and CMH lies in the moderate
21 IP category (41 to 60). This classification helps distinguish the level of imposter characteristics in the two different institutes. CMH
22 reflects the results of medical students, while LUMS shows how non-medical individuals feel.

Comentado [FJBE5]: You must provide average and standard deviation when describing age.

Comentado [MOU6]: Since the data for age was collected in the three categories (as mentioned in Table 1) 18-20, 21-23 and 24-27, hence we are unable to determine the exact mean age of our volunteers but the frequency and percentage has been mentioned to get the idea of where the mean lies.

Comentado [FJBE7]: This is not what we are seeing in table 2.

Comentado [MOU8]: It has been fixed now.

Comentado [MOU9]:

Table 2 further goes on to compare the genders with their respective CIP score calculated, mean determined, as done for the universities, according to the questions chosen by the respondents, and unpaired t-test applied. The total CIP Score is significant, at p-value <0.05 and has a mean of 68.39 (± 13.737) for females and 58.52 (± 11.345) for males. The total mean score for females suggests a higher value and indicates to be in the third category, where frequent impostor phenomenon characteristics are experienced. While the mean score for male lies in the second category with moderate IP characteristics.

Conclusively, non-medical students of LUMS and females are reported to fall in the frequent category, while medical students and males fall in the moderate category.

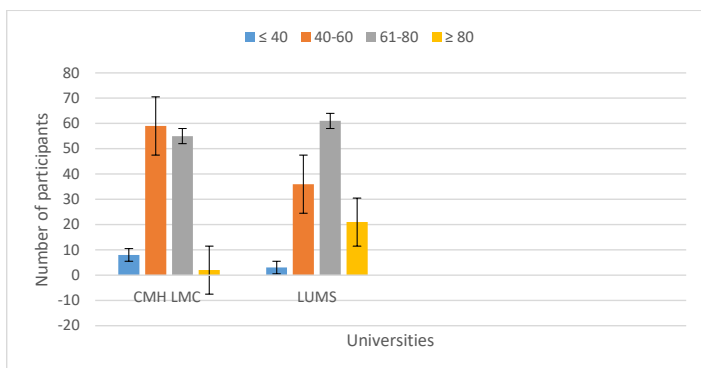
Table 2: Comparison of Total CIP Scores by University and Gender using t-test

Category	Group	Total CIP Score		p-value
		Mean	Standard Deviation	
University	CMH	58.36	11.413	<0.001
	LUMS	67.08	13.704	
Gender	Female	68.39	13.737	<0.001
	Male	58.52	11.345	

(CMH= CMH Medical College representing medical students, LUMS= LUMS University representing non-medical students)

Figure 1, a clustered bar graph shows a comparison of the Total CIP score against the count, in both universities with confidence interval at 95%. Each bar represents a category from the Clance scale. Score less than 40 is depicted in blue, score between 40 and 60 is in orange, grey shows score between 61 and 80, while yellow reflects the scores above 80. X-axis has both the universities with CMH showing result for medical students and LUMS for non-medical. Y-axis depicts the count or the number of participants in each institute having a certain CIP score. This graphical tally between the two groups is an easier portrayal of impostor characteristics. The figure shows that LUMS predominantly had a higher score in the range 61 to 80, as the grey bar is significantly taller, while CMH ranged maximum in the two ranges, 41 to 60, and 61 to 80, with the latter having a slightly higher frequency. This aligns with our previous tables and un-paired t-test analysis.

Figure 1. Comparing Impostor Phenomenon Score with Universities



(CMH= CMH Medical College representing medical students, LUMS= LUMS University representing non-medical students, blue ≤ 40, orange=40-60, grey=61-80, yellow ≥80)

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2
3
4 A multivariate linear regression model was used to further analyze the relationship of the various determining variables with the total
5 CIP score. The results showed significant dependency of the total CIP scores on the variables, university and gender, with the
6 regression p-value coming out to be less than 0.05. This highlighted the significance of these factors in influencing feelings of
7 Impostor Phenomenon.

DISCUSSION.

Impostor Phenomenon is increasingly affecting aspiring individuals, leading capable professionals to doubt themselves amidst fears of falling short compared to their peers. This study aimed to examine its prevalence among both medical and non-medical students, while also exploring potential gender differences. Additionally, it sought to raise awareness among mentors and students to address and mitigate these challenges effectively.

The study accounted for the prevalence of Impostor Phenomenon (IP) among medical and non-medical students in the two universities CMH Lahore Medical College and Institute of Dentistry (CMH) and Lahore University of Management Sciences (LUMS) in Lahore, Pakistan. The results showed that both medical and non-medical students experience Imposter Phenomenon (IP) to a certain degree, with both of them having similar significance for each of the variables. However, the prevalence of IP was found to be slightly higher in LUMS students (non-medical) as compared to CMH students (medical) with the mean value of the total CIP scale to be 67.08 (± 13.704) and 58.36 (± 11.413) respectively. This showed the Impostor Phenomenon for LUMS to be in the range 61-80, the most frequent IP characteristic range. In contrast, in the medical students of CMH the distribution of the score was found to be 41-60, the moderate IP characteristics range. This finding is in accordance with previous studies that have reported a higher prevalence of IP in many different disciplines other than medicine. One such study done at a university of Southwest Arkansas on liberal arts students, showed a positive association was found between Impostor Phenomenon (IP) and depression (BDI-II) scores among college students, with women exhibiting higher IP scores than men.¹⁸ An article on chemical engineers and their feelings of impostor-ism quite interestingly describes how students in non-medical fields such as engineering feel this phenomenon.¹⁹

Over time, heightened competition among students has placed significant pressure on colleges to enhance curricula and integrate advanced information into already rigorous four-to-five-year educational programs. However, governmental alignment with these demands for educational changes has been lacking, resulting in increased stress and pressure on institutions, which subsequently impacts students' mental health negatively.²⁰

The finding that medical students experience various levels of Impostor Phenomenon is understandable, given the competitive and demanding nature of medical education. Medical students face high levels of stress and pressure to excel, which can intensify feelings of inadequacy and self-doubt. This aligns with a previous study that highlighted impostor phenomenon among students in academically rigorous programs.²¹

Research comparing house officers and dental students has shown differences in how they experience intellectual disparity, particularly in clinical versus non-clinical aspects.¹⁶ House officers, due to their greater exposure to diverse environments, tend to experience fewer impostor feelings over time, supporting the hypothesis that familiarity with one's surroundings reduces such thoughts.

Research consistently shows that Impostor Phenomenon (IP) affects both genders, but is more prevalent among females.²² This gender disparity is underscored by higher mean scores among females compared to males—68.39 (± 13.737) for males and 58.52 (± 11.345) for females—placing females in the frequent IP range (61 to 80) and males in the moderate IP range (41 to 60). These findings align with previous studies indicating that females are more likely to experience IP.^{16,23}

Comentado [FJBE10]: You are talking plural but citing a single study.
Also, this goes in different direction than your findings.

Comentado [FJBE11]: This doesn't need to be capitalized

1 Women often face more mental health challenges, including higher rates of depression, possibly influenced by hormonal
2 fluctuations such as estrogen levels in disorders like premenstrual dysphoric disorder, postpartum depression, and
3 postmenopausal depression.²⁴ Another such research on first-generation STEM majors concluded that women have higher
4 phases of 'feeling like a fake'.¹⁵ They also have to face a lot of societal pressure and need to fight against many to achieve
5 or accomplish goals that they have been dreaming about.²⁵ Frequently, female achievements are overlooked, potentially
6 fueling self-doubt and exacerbating Impostor Phenomenon (IP).²⁶ In another study comparing medical students, males
7 scored significantly lower on the Clance Impostor Phenomenon scale (CIP) by 9.15 points.²⁷ A student from this research
8 expressed feeling unworthy of pursuing a medical career when comparing herself to male colleagues. These instances
9 underscore the impact of societal perceptions and gender dynamics on individuals' experiences of competence and self-
10 worth in academic as well as professional settings.

11 There have been many such researches focusing primarily on the relation between mental health and impostor sickness
12 such as the one done in Isfahan University Students that showed a positive correlation between the two.¹⁷ There has been
13 similar research exploring the idea of self-esteem and racial identity in relation to the Impostor Phenomenon, in an African
14 American College.¹⁸ Both studies conclude the importance of support and confidence building by the mentors of the
15 students.

16
17 Anna Parkman in her article about the incidence and impact of impostor phenomenon highlights the importance of mental
18 health and compares it with Impostor Phenomenon.²⁸ Many articles have shown a positive correlation between stress,
19 anxiety and depression with it.^{22,28}
20

21 The drive for perfectionism, combined with the pressure to meet familial expectations, intensifies stress levels, as evidenced
22 in a study comparing stress among medical, engineering, and nursing students.²⁹ A literature review exploring perfectionism,
23 mental health, and Impostor Phenomenon in medical education underscores their interrelated negative impacts, aligning
24 closely with our research objectives.³⁰

25 The study identified several underlying causes of Impostor Phenomenon, including disparities related to program types,
26 gender, and years of study, all of which negatively impact confidence and self-esteem. Educators across fields of
27 education should recognize the prevalence of this phenomenon among students and implement interventions to enhance
28 self-efficacy and confidence. These interventions could involve mentoring programs, stress-management training, and
29 fostering supportive learning environments, particularly in medical education.

30 Despite aligning with previous research, the study encountered limitations. This included a relatively small sample size
31 confined to two universities in Lahore, which may restrict the generalizability of findings. Future research should employ
32 larger and more diverse samples, incorporate measures of depression, anxiety, and stress to assess correlations with Impostor
33 Phenomenon, and explore variations among medical and non-medical specialties. Moreover, future studies could investigate whether
34 the phenomenon is transient or permanently linked to mental health, and explore its association with academic performance more
35 comprehensively. It is suggested to keep in view of the various socio-economic background as well as the level of maturity in the
36 different year of studies that could also impact the results. Hence, further studies should be employed focusing on these confounders.

37
38

Conclusion:

In conclusion, this study highlights the prevalence of the Impostor Phenomenon among medical and non-medical students, with non-medical students and females exhibiting higher CIP scores. These findings emphasize the need for targeted interventions to fostering a positive educational environment and to support students in managing impostor phenomenon through the implementation of programs aimed at promoting self-efficacy and self-confidence. Institutes should introduce compulsory monthly counseling sessions to monitor students' mental health. Parents should be involved as needed. Peer learning sessions, guided by mentors, should be encouraged to break down barriers and foster a supportive learning environment. Importantly, students should realize that each individual is unique, having their own strengths and weaknesses. Therefore, comparisons can be self-detrimental and should be avoided, focusing on one's own positive qualities, while being appreciative of all.

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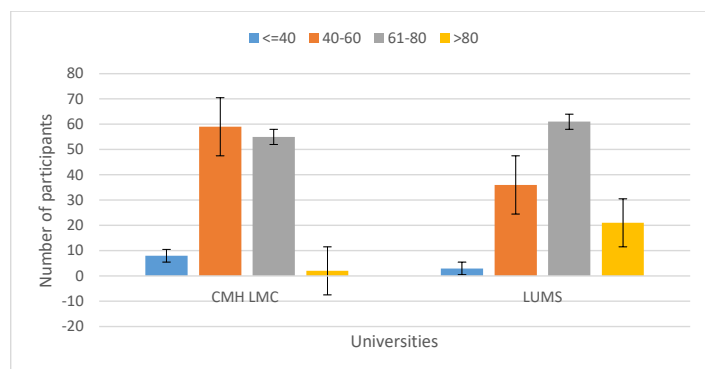
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1 **Tables and Figures**

3 **Figure 1: Comparing Impostor Phenomenon Score with Universities**



(CMH= CMH Medical College representing medical students, LUMS= LUMS University representing non-medical students, blue = ≤40, orange=60-40, grey= 80-61, yellow=>80)

8 **Table 1. Demographic details of students**

Demographics	Frequency	Percentage
Age		
18-20	113	46.7
21-23	114	47.1
24-27	15	6.2
Gender		
Male	139	57.4
Female	103	42.6
University		
CMH	121	50.0
LUMS	121	50.0
Year of Study		
First	89	36.8
Second	23	9.5
Third	41	16.9
Fourth	84	34.7
Fifth	5	2.1

(CMH= CMH Medical College representing medical students, LUMS= LUMS University representing non-medical students)

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Table 2: Comparison of Total CIP Scores by University and Gender using t-test

Category	Group	Total CIP Score		p-value
		Mean	Standard Deviation	
University	CMH	58.36	11.413	<0.001
	LUMS	67.08	13.704	
Gender	Female	68.39	13.737	<0.001
	Male	58.52	11.345	

3

(CMH= CMH Medical College representing medical students, LUMS= LUMS University representing non-medical students)

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