Prevalence of impostor syndrome among healthcare students in Saudi Arabia and its association with academic performance

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Abstract: Impostor syndrome refers to the inability to internalize accomplishments observed in high-achieving individuals and is linked with persistent anxiety, fear, and stress. The current study aimed to evaluate the prevalence of impostor syndrome (IS) and its association with academic performance among healthcare students in the Kingdom of Saudi Arabia (KSA). This was a cross-sectional study that utilized the Clance Impostor Phenomenon Scale to evaluate impostor syndrome among 620 healthcare students in KSA. Additionally, participants' academic performance was assessed by collecting Grade Point Average (GPA), collected from October 2023 to February 2024. Of the 620 healthcare students surveyed, 380 (61.3%) were female, and 604 (97.5%) were between the ages of 18 and 27. A total of 306 (49.4%) of the respondents reported experiencing high to intense levels of IS. While females have a higher prevalence of high to intense IS than males, this difference was insignificant (p = 0.29). Compared with students with a GPA of $4.5 - 5$, the GPA ranges from 2 to 2.74 (OR: 0.168, 95%CI: 0.032-0.888) and 3.75 to 4.49 (OR: 0.032, 95%CI: 0.036-0.864) have relatively lower risk of developing high to intense IS. A high GPA and being from the Western region increase the risk of high to intense IS among healthcare students in KSA. These findings suggest that IS may intensify with academic success and geographical location, irrespective of demographic factors.

Keywords: Academic performance, Higher education, Impostor syndrome, Mental health, Students' Behaviour.

1. Introduction

Impostor syndrome, which is also known as impostor phenomenon, is a condition that describes high-achieving individuals who, despite their objective successes, fail to internalize their accomplishments and have persistent self-doubt and fear of being exposed as a fraud or impostor [1]. Individuals struggling with impostor syndrome do not attribute their performance to their actual competence, instead ascribe their successes to external factors such as luck or help from others while considering setbacks as evidence of their professional inadequacy [2, 3].

Clance originally identified the syndrome among high-achieving professional women, but more recent research has found these feelings of inadequacy among men and women, in many professional settings, and among multiple ethnic and racial groups [4, 5]. Common signs of impostor syndrome include perfectionism, overworking, downplaying one's achievements, fear of failure, and dismissing compliments or praise [6, 7]. This syndrome is closely linked with anxiety, low self-esteem, and a fluctuating self-concept, all of which can significantly impact an individual's well-being and professional performance [8, 9].

In medical education, impostor syndrome presents several challenges, as students affected by it may be less likely to actively participate or volunteer information in academic settings compared to their peers [**Error! Reference source not found.**]. This reluctance to engage may stem from a fear of being exposed as incompetent or unworthy. Consequently, there is a need to adapt teaching methods and curriculum design to accommodate the significant proportion of learners who experience impostor syndrome [10]. To address this issue, a previous study was conducted to determine the frequency of impostor syndrome among third, fourth, and final-year students in a public sector medical college with the aim to inform strategies for improving teaching and learning methodologies, as well as curriculum design, to better support students struggling with impostor syndrome [11].

While impostor syndrome has garnered considerable attention beyond, particularly in relation to professional success [12, 13], there is a notable absence of research conducted in Saudi Arabia examining the relationship between impostor syndrome and academic performance among healthcare students. Therefore, impostor syndrome remains relatively understudied in Saudi Arabia. This study aimed to address this gap in knowledge and provide a valuable insight to the healthcare community in Saudi Arabia to share awareness and provide the necessary interventions that enhance the psychological support for healthcare students struggling with impostor syndrome.

2. Methods

2.1. Study Design and Population

This is a cross-sectional survey that was conducted and distributed through an online platform (Google) between October 2023 and February 2024. A convenient sampling technique was utilized targeting governmental and private allied healthcare programs across the Kingdom of Saudi Arabia. Additionally, faculty members across the Kingdom of Saudi Arabia were contacted to distribute the questionnaire to their taught undergraduate healthcare students. The study targeted diverse range of disciplines such as nursing, respiratory care, anesthesia, clinical laboratory sciences, emergency medical services, dental and oral health care, biomedical technology, health information management, physical therapy, and other related fields.

2.2. Questionnaire

The study utilized an online cross-sectional survey as the primary means to collect data, structured into four sections. The first section focuses on obtaining voluntary participation (consent) from individuals interested in being part of the research. Following this, the second section focused on determining whether respondents are currently enrolled in healthcare-related academic programs. Subsequently, the third section concentrates on gathering demographic data including gender, age, specialty, academic year, and current GPA. The fourth section was about implementing the Clance IP scale, which is a validated instrument containing a 5-point scale and consisting of 20 questions to assess the characteristics and severity of impostor syndrome. The overall score ranges from 20 to 100. Respondents with a total score of 40 or less were labeled as having low Impostor characteristic (Low IS) while a score between 41 and 60 is labeled as having moderate IS. Scores between 61 to 80 are linked with high impostor feelings (High IS) with a score higher than 80 linked with intense IS experiences [14].

2.3. Ethical Approval

This study was conducted in line with the local institutional and Saudi national research standards and according to the 1964 Helsinki declaration and its later amendments. Institutional Review Board approval for the study was obtained from Prince Sultan Military College of Health Sciences, ID number (IRB-2024-RC-001). Participants were fully informed about the aim and techniques of this study and participation was wholly on a voluntary basis. All data was collected anonymously following the obtainment of informed consent. Consent was designed into the survey whereby only consenting participants were able to proceed into the survey question and participants who did not consent were automatically taken to the end of the survey and were unable to proceed.

2.4. Statistical Analysis

SPSS Statistics 20 (IBM Corp., Armonk, New York) was utilized for data coding, validation, and analysis. Categorical data were compared using the chi-squared test, while numerical data were analyzed using independent sample T-test and ANOVA. Additionally, linear regression was applied to study the relationship between the dependent and independent variables. The categorical variables were reported and presented in percentages and frequencies. Statistical significance was considered if the 2-tailed $p < 0.05$. The main dependent variable was impostor syndrome while age, gender, and academic performance were analysed as independent variables.

3. Results

3.1. Demographic Data

The demographic characteristics of the participants include gender, age group, region, type of university, current academic year, GPA, and specialty. The sample consisted of 620 participants, with 61.3% female. The majority (471, 76.0%) were aged 18-22, and mostly from the Eastern region (312, 50.3%). Most participants attended government universities (583, 94.0%), and mostly in their fourth year of study (221, 35.6%) with GPAs between 4.5 and 5.0 (355, 57.3%). The top specialties were Respiratory Care (165, 26.6%), Nursing (79, 12.7%), and Anesthesiology (67, 10.8%) (

Table 1).

Table 1.
Demographic data of healthcare students respond to this questionnaire.

Demographic characters	Frequency (Percentage)
Gender	
Male	240 (38.7)
Female	380 (61.3)
Age group	
18 − 22	471 (76.0)
23 − 27	133 (21.5)
28 − 32	8 (1.3)
More than 32	8 (1.3)
Region	
Central	78 (12.6)
Eastern	312 (50.3)
Northern	45 (7.3)
Southern	51 (8.2)
Western	134 (21.6)
Type of University	
Government	583 (94.0)
Private	37 (6.0)
Current academic year	
First year	69 (11.1)
Second year	101 (16.3)
Third year	130 (21.0)
Fourth year	221 (35.6)
Internship	99 (16.0)
Current GPA	
2.0 - 2.74	11 (1.8)
2.75 − 3.74	45 (7.3)
3.75 − 4.49	209 (33.7)
4.5 − 5.0	355 (57.3)
Specialty	

Anaesthesia	67 (10.8)
Biomedical technology	36 (5.8)
CLS	51 (8.2)
DOH	20 (0.3)
EMS	36 (5.8)
HIM	57 (9.2)
Medicine	42 (6.8)
Nursing	79 (12.7)
PT	48 (7.7)
Pre-clinical	19 (3.1)
RC	165 (26.6)

Note: RC; Respiratory care, PT; Physical therapy, HIM; Health information management, EMS; Emergency Medical services, DOH; Dental & oral health, CLS; Clinical laboratory specialist.

3.2. Prevalence of Impostor Syndrome Among Healthcare Students

The prevalence of IS among healthcare students was examined across various demographic parameters in this study. Gender did not significantly affect the prevalence of impostor syndrome, with similar distributions observed among male and female students. Similarly, age, region, type of college, and academic year showed no significant impact on impostor syndrome prevalence. Of all participants, 306 (49.4%) had high to intense impostor syndrome scores (**Error! Reference source not found.**).

Table 2.
Correlation between Impostor Syndrome and demographic characteristics of participants.

Demographic characters		Impostor syndrome		Total	P – value
		Low and moderate impostor syndrome	High and intense impostor syndrome		
Gender	Male	128 (53.3)	112 (46.7)	240	0.29
	Female	186 (48.9)	194 (51.1)	380	
Age group	18 – 22	242 (51.4)	229 (48.6)	471	0.7
	$23-27$	64 (48.1)	69 (51.9)	133	
	$28-32$	3 (37.5)	5 (62.5)	8	
	> 32	5 (62.5)	3 (37.5)	8	
Region	Central	36 (46.2)	42 (53.8)	78	0.14
	Eastern	155 (49.7)	157 (50.3)	312	
	Northern	29 (64.4)	16 (35.6)	45	
	Southern	31 (60.8)	20 (39.2)	51	
	Western	63 (47)	71 (53)	134	
Type of college	Government	295 (50.6)	288 (49.4)	583	0.93
	Private	19 (51.4)	18 (48.6)	37	
Current academic year	First year	39 (56.5)	30 (43.5)	69	0.88
	Second year	51 (50.5)	50 (49.5)	101	
	Third year	65 (50)	65 (50)	130	
	Fourth year	111 (50.2)	110 (49.8)	221	
	Internship	48 (48.5)	51 (51.5)	99	
Total		314 (50.6)	306 (49.4)	620	

3.3. Mean Impostor Syndrome Scores

Analysis of Variance (ANOVA) and independent sample t-tests were employed to assess variations in Impostor Syndrome (IS) mean scores across demographic categories. The comparison between genders revealed a slightly higher but statistically insignificant mean IS score among female students compared to males (61.79 ± 0.8 vs 59.32 ± 0.95; p = 0.5). Further investigation via ANOVA explored mean IS score differences among age groups, regions, academic years, and current GPA categories. Notably, statistically significant variations were found among current GPA categories (p = 0.03), with students scoring GPAs between 2.0 and 2.74 exhibiting significantly higher mean IS scores (66.36 ± 12). Invariably, lower GPA students showed notably higher mean IS scores, suggesting a potential negative effect of impostor syndrome tendencies on academic performance (

Table 2).

Table 2.
Analysis of variance assessing the difference in the mean impostor syndrome scores (IS) across the various demographics.

Demographic characters		IS score, mean ± SD	P- value
Gender	Male	59.32 ± 0.95	0.5
	Female	61.79 ± 0.8	
Type of college	Government	60.92 ± 15.38	0.61
	Private	59.59 ± 13.37	
Age group	$18 - 22$	61.16 ± 15.14	0.78
	$23 - 27$	59.99 ± 16.12	
	$28 - 32$	59.38 ± 12.43	
	> 32	57.38 ± 10.13	
Region	Central	62.96 ± 15.28	0.09
	Eastern	61 ± 14.99	
	Northern	56.82 ± 14.41	
	Southern	57.33 ± 16.25	
	Western	61.99 ± 15.53	
Academic year	First year	58.3 ± 13.59	0.67
	Second year	60.98 ± 16.32	
	Third year	61.65 ± 14.35	
	Fourth year	61.14 ± 15.42	
	Internship	60.69 ± 16.16	
Current GPA	2 - 2.74	66.36 ± 12	0.03*
	2.75 - 3.74	54.84 ± 16.73	
	3.75 - 4.49	61.25 ± 14.88	
	4.50 - 5.00	61.18 ± 15.25	

Note: SD: Standard Deviation, (*) Represents significant p-value.

3.4. Bonferroni Multiple Comparison Test for GPA with the Total IS

The Bonferroni multiple comparison test was employed to assess overall impostor syndrome scores among healthcare students across different GPA categories, revealing significant differences between specific GPA groups. Notably, students with the lowest GPA ($2.00 - 2.74$) exhibited higher impostor syndrome scores compared to those with higher GPAs (e.g., $2.75 - 3.74$ and $4.50 - 5.00$). Additionally, significant distinctions in impostor syndrome ratings were observed among students with GPAs falling within the ranges of $2.75 - 3.74$, $3.75 - 4.49$, and $4.50 - 5.00$. However, no appreciable variations in impostor syndrome scores were found between students with the top 2 GPAs ($3.75 - 4.49$ and $4.50 - 5.00$;

Table 3).

Table 3.
Bonferroni-corrected multiple comparison test assessing the difference in the total is scores across various gaps of respondents.

Current GPA	Current GPA	SEM	P-value
2 – 2.74	2.75 – 3.74	5.10948	0.025*
	3.75 – 4.49	4.69923	0.277
	4.50 – 5.00	4.65067	0.265
2.75 – 3.74	3.75 – 4.49	2.49645	0.011*
	4.50 – 5.00	2.40378	0.009*
3.75 – 4.49	4.50 – 5.00	1.32446	0.957

Note: SEM: Standard Error of Mean, (*) Represents significant p-value.

3.5. Logistic Regression Analysis

Logistic regression analysis was applied to examine the correlation between healthcare students' demographic characteristics and impostor syndrome, specifically focusing on low and moderate impostor syndrome as opposed to high and intense impostor syndrome. The findings identified several important impostor syndrome predictions. The analysis included gender, age group, region, specialty, academic year, and current GPA as independent factors. Of these factors, region was a major predictor of impostor syndrome, with Eastern students less likely than other students to have high and intense impostor syndrome. Furthermore, GPA ranges of $2.00-2.74$ and $3.75-4.49$ were significant predictors of impostor syndrome, whereby students in these GPA ranges were less likely than those in other GPA ranges to have high and intense impostor syndrome (

Table 4).

Table 4.
Logistic regression analysis assessing the correlation between healthcare students' demographic characteristics and impostor syndrome.

Variables	OR (95% CI)	P-value
Gender (Compared to female)		
Male	1.157 (0.797 - 1.679)	0.443
Age group (Compared to >32)		
Age group(18 - 22)	1.262 (0.793 - 2.006)	0.326
Age group(23 - 27)	2.144 (0.476 - 9.647)	0.320
Age group(28 - 32)	0.683 (0.152 - 3.074)	0.619
Region (Compared to Western)		
Region(Central)	0.88 (0.515 - 1.501)	0.638
Region(Eastern)	0.413 (0.183 - 0.934)	0.034*
Region(Northern)	0.57 (0.266 - 1.223)	0.149
Region(Southern)	1.035 (0.577 - 1.855)	0.909

Specialty (Compared with RC)		
Specialty (Anaesthesia)	0.743 (0.317 – 1.741)	0.494
Specialty (Biomedical technology)	1.619 (0.755 – 3.471)	0.216
Specialty (CLS)	1.232 (0.427 – 3.558)	0.699
Specialty (DOH)	0.815 (0.354 – 1.877)	0.631
Specialty (EMS)	1.196 (0.573 – 2.499)	0.633
Specialty (HIM)	0.629 (0.277 – 1.429)	0.268
Specialty (Medicine)	0.774 (0.395 – 1.517)	0.456
Specialty (Nursing)	1.284 (0.558 – 2.954)	0.556
Specialty (PT)	1.241 (0.428 – 3.602)	0.691
Specialty (pre-clinical)	0.803 (0.435 – 1.481)	0.482
Type of University (Government)	0.808 (0.393 – 1.663)	0.563
Academic Year (Compared with interns)		
Academic Year (First year)	1.36 (0.713 – 2.593)	0.350
Academic Year (Second year)	1.431 (0.749 – 2.734)	0.278
Academic Year (Third year)	1.364 (0.755 – 2.463)	0.303
Academic Year (Fourth year)	1.312 (0.647 – 2.662)	0.451
Current GPA (compared with 4.5-5.0)		
Current GPA $(2 - 2.74)$	0.168 (0.032 – 0.888)	0.036*
Current GPA $(2.75 - 3.74)$	0.218 (0.045 – 1.059)	0.059
Current GPA $(3.75 - 4.49)$	0.177 (0.036 – 0.864)	0.032*

Note: OR: Odds ratio, CI: Confidence interval, GPA: Grade point average, (*) Represents significant p-value.

4. Discussion

The results of this study provide an overview of impostor syndrome among healthcare students in the Kingdom of Saudi Arabia (KSA). The findings underscore the negative effect of impostor syndrome among healthcare students and highlight the need for targeted interventions to address its impact on academic performance and well-being. The identification of significant predictors of impostor syndrome, such as current GPA and regional differences, offers valuable insights for the development of tailored support strategies aimed at mitigating impostor feelings and promoting students' psychological resilience. Moreover, the result highlights the role of demographic factors in shaping impostor syndrome experiences and underscores the importance of considering diverse factors when designing future intervention.

Our cross-sectional study shows a significantly high prevalence of high to intense Impostor Syndrome (IS) among Saudi Arabia's healthcare students (306, 49.4%). Interestingly, this prevalence is higher than the numbers reported in literature. For instance, Henning et al., and Villwock et al., IS prevalence of 30.2% and 38.0% respectively while lower than that reported by Franchi and Russell-Sewell who documented a comparatively higher prevalence of 65.4% [15-17]. Comparably, 32.5% of US family medicine resident physicians were reported to have IS according to the work by Oriel et al [18]. Further, studies by Legassie et al [10], and Ikbaal et al., [19], showed that resident physicians had prevalence rates, at 45.7% and 43.8%, from Canada and Malaysia, respectively. Furthermore, two investigations carried out in Pakistan found that medical students had incidence of IS, ranging from 47.3% to 54.5% [11, 20]. Further, Mascarenhas et al found that among Indian resident physicians, the prevalence of IS was 41.3% [21]. These differences in the prevalence rates point to possible effects of cultural or regional differences on the prevalence of IS among the medical community. Furthermore, these rates could be impacted by the healthcare and education systems.

Careful consideration is required due to the significant impact impostor syndrome has on the self-esteem and performance of healthcare workers. The broad frequency shown across many specializations and healthcare settings suggests a systemic issue that must be addressed. Effective medical practice is

facilitated by high levels of self-esteem and low levels of impostor syndrome, as highlighted by Mascarenhas et al [21]. These results highlight the need for thorough investigation in a variety of healthcare settings, since impostor syndrome is common among medical and surgical residents [1]. Investigating the potential impact of the work environment on the prevalence and severity of impostor syndrome in various age groups and specializations may provide important new information. In addition, it is recommended that healthcare organizations, educational institutions, and regulatory agencies give precedence to the examination and resolution of impostor syndrome to promote a healthy workplace and improve patient outcomes.

It is noteworthy that while no significant difference in IS scores were found across gender, age groups, or geographic areas in this study, there was a slightly higher IS score in females compared to males (59 for males and 61 for females). The slightly higher IS in female has been previously reported. Specifically, Villwock et al show that females were more likely to show higher IS than males (49.4% vs. 23.7%; p = 0.004) [16]. Comparably, studies by Legassie et al., [10] Oriel et al., [18], Henning et al., [15], and Almatrafi et al. revealed that women were noticeably more likely than men to feel like impostors [22]. Also, a recent systematic review indicated that women may report higher frequencies of impostor syndrome [23]. However, most of the early studies on the impostor phenomenon included mostly female subjects, which may have influenced the findings of the systematic review. Aside the disparate results, these study highlights the vulnerability of female and male healthcare workers to impostor syndrome, underscoring the necessity for healthcare institutions to acknowledge impostor syndrome as a problem that affects the entire workforce rather than just women. Further, a notable difference was discovered in the IS scores with respect to the different GPA groups of medical students. Specifically, there were significant differences in the IS scores amongst students with varying GPA ranges, suggesting that impostor syndrome may directly or indirectly affect academic achievement of medical students. Impostor syndrome is more common in medical students and residents who have low self-esteem, according to several studies [19, 21, 24]. Furthermore, it has been shown that IS syndrome in both low and high scores were significantly higher among lower age students rather than higher ages [25]. Although we did not observe this significant age-dependent difference in our study population. Also, the impostor syndrome is slightly higher among third- and fourth-year healthcare students (

Table 2).

This is the first study in Saudi Arabia that investigate the academic performance and its association with impostor syndrome. The demographic analysis provides a comprehensive overview of the participant characteristics, offering valuable insights into the diverse representation across various demographic factors pertinent to healthcare education. The study's large sample size and detailed demographic breakdown contribute to the robustness of the findings, allowing for a nuanced understanding of impostor syndrome prevalence among healthcare students. Additionally, the use of statistical analyses, including ANOVA and logistic regression, enhances the rigor of the investigation and facilitates the identification of significant predictors of impostor syndrome.

Despite its strengths, this study has certain limitations. Firstly, the reliance on self-reported data may introduce response biases and inaccuracies, potentially influencing the reliability of the findings based on the Hawthorne effect [26, 27]. Moreover, the cross-sectional nature of the study limits the ability to establish causal relationships between demographic factors and impostor syndrome as well as the changes in participants" impostor syndrome scores across different study period/year and time points [28, 29]. Additionally, the study's focus on healthcare students from specific regions and academic institutions may restrict the generalizability of the findings to broader populations of healthcare students.

In conclusion, the prevalence of impostor syndrome (IS) among healthcare students was examined, as well as how it is related to demographic variables such as gender, age group, location, university type, current academic year, current GPA, and specialization. Students with the highest GPA (4.5-5) and those

from the Western KSA have greater risk of developing high to intense impostor syndrome. We found no differences in the mean impostor syndrome scores among demographic groups, including gender, type of college, age group, and current academic year.

The development of focused interventions and support systems aiming at improving student well-being and academic achievement should focus on determinant of high to intense IS. Healthcare educators and legislators can establish a supportive learning environment that promotes the mental health and professional growth of healthcare students by addressing IS. Future studies should longitudinally assess IS in a multicenter and multinational cohort.

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