

Am I A Fraud? Occurrence and Factors Associated with Impostor Phenomenon Among Medical Students of Khartoum University, 2022

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Abstract

Background: The impostor phenomenon (IP) is the tendency to attribute success to external factors rather than to one's abilities. It is frequent among students and has a negative impact on their wellbeing. This study aimed to assess the occurrence and mental health factors associated with IP in medical students. **Methods:** Cross-sectional study of University of Khartoum Medical students (December 2021–January 2022), using convenience sampling. We collected the Clance Impostor Phenomenon Scale (CIPS), Patient Health Questionnaire-4 (PHQ-4: anxiety and depression), 2-item Maslach B burnout Inventory (MBI), and Single-Item Self-Esteem Scale (SISE). Data was analyzed using SPSS with correlation analyses, linear regression, and Chi-square tests. **Results:** Among 409 medical students, the impostor phenomenon (IP) prevalence was 52.8% (216 students), with a mean CIPS score of 63.37 ± 17.02 . IP was more common in females (71.8%) and students aged 19–21 years (40.7%). Anxiety (41.6%), depression (48.7%), and burnout (39.6% emotional exhaustion; 26.9% depersonalization) were prevalent, with higher rates in females. Regression analysis showed significant predictors of IP, including burnout (+1.32 points per unit, $p < 0.001$), perfectionism (+0.86 points per unit, $p < 0.001$), parental overprotection (+2.43 points per unit, $p < 0.001$), and depression (+2.90 points, $p = 0.024$), while self-esteem showed a negative association (−4.19 points per unit, $p < 0.001$). Gender differences were observed in three CIPS items, with stronger female endorsements. **Conclusions:** IP is prevalent and linked to family dynamics, personality traits, and mental health issues. Efforts to increase awareness and facilitate IP management should be implemented.

Introduction

Clance and Imes first used the term "impostor phenomenon" (IP) in 1978 to describe an internal feeling of intellectual phoniness that appears to be more common and severe in many accomplished women.¹ Pauline Rose Clance, a pioneer in the impostor phenomenon research field, defined the impostor phenomenon in 1985 as "an internal experience of intellectual phoniness that those who feel fraudulence and worthlessness in spite of outstanding academic or professional accomplishment have."² The women in Clance's study credited their achievements to outside influences like luck, misgrading, or the faulty judgment of professors.¹

The impostor phenomenon, impostorism, or imposter syndrome, has received increasing attention in the last two decades. Subsequent research described the presence of IP in the male population, in many professional settings, and among multiple ethnic and racial groups.³

IP prevalence ranged greatly from 9% to 82%, mostly depending on the screening method and cutoff points employed to evaluate impostor phenomenon symptoms.³ Many of these studies were conducted in the USA. A recent study in Saudi Arabia found a prevalence of 57.8% in a sample of 384 young

adults.⁴ Another study in the medical students of Imo State University, Owerri, Nigeria, found that 54.5% of the medical students had a CIPS score of 40 or below, indicating a few characteristic features of IP.⁵ Medical students are among those afflicted with IP. This can be attributed to the highly competitive and demanding nature of admission to medical schools and the competitive nature of medical schools themselves. This course of study could promote the emergence of unhealthy thought patterns, such as impostorism, maladaptive perfectionism, and connecting self-worth with academic achievement.⁶ According to a study by Rosenthal et al., 87% of new students had high or extremely high IP.⁷

Some studies have associated IP with personality traits like self-esteem (which was found to negatively correlate with IP)⁵ and maladaptive perfectionism (which is considered a potential predisposing and sustaining factor of IP).⁸ IP is also associated with psychiatric comorbidities such as depression, anxiety, and burnout.³ It should be noted that the studies included are cross-sectional, and the direction of causality can't be deduced. The systematic review by Thomas and Bigatti pointed out that IP and perfectionism are among the most powerful predictors of psychological distress in medical students, with perfectionism also being a strong predictor of anxiety and depression.⁹

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Another factor involved with IP is family dynamics, such as maternal and paternal overprotection, which were linked with higher impostor scores.¹⁰

Medical students are at a high risk of developing Impostor Phenomenon (IP)⁷, which has been identified as a predictor of psychological distress in this population.⁹ A recent study by Katherine S. Hu et al. revealed that 31.9% of 169 medical students had "high" or "intense" IP scores. In comparison, only 3.5% and 12.2% of students had low to moderate scores, respectively. The study found that students with high/intense levels of IP were more likely to experience negative feelings of shame/embarrassment (22.2%) and inadequacy (29.6%), which were associated with higher levels of depression and anxiety.¹¹

This study aims to increase awareness about IP and associated mental health factors among medical students worldwide. It also explores associated family dynamics and introduces a new regression model to help in identifying high risk medical students. This study is also a first of its kind in the Sudanese medical student's population and adds the growing body of literature in Sudan and the African region. Therefore, the aim of this study is to identify the occurrence and factors associated with impostor phenomenon among medical students at Khartoum University, Sudan, in 2021–2022.

Methods

Study Design: This cross-sectional analytical study was conducted at the University of Khartoum, Faculty of Medicine, in Sudan. It included all students enrolled in the faculty at the time, comprising seven batches and a total population of 2,334 students. The study was carried out from December 23, 2021, to January 17, 2022.

Sampling Method: A non-probability convenience sampling method was employed. The proposed sample size was calculated¹² based on a prevalence of 50%, a confidence level of 95%, a 5% margin of error, and a population size of 2,334 students. This resulted in a proposed sample of 330 participants, which was divided among the seven batches, with approximately 47 students selected from each batch. To account for potential non-responses, the sample size was increased by 20%, resulting in the collection of 409 responses.

Data Collection: Data was collected using a self-administered Google Form questionnaire, which was semi-structured, closed-ended, and pre-coded. The questionnaire consisted of three main sections. The first section captured the socio-demographic data of participants. The second section assessed the impostor phenomenon and its associated factors. The third section provided participants with links to articles and videos about the impostor phenomenon and its management to raise awareness about the condition.

Measurement Tools: We used the Clance impostor phenomenon scale (CIPS), a 20-item scale, self-reported measure, to assess IP. It has a range of 20 to 100 and was

interpreted as follows: 40 or less = few impostor characteristics; 41 to 60 = moderate IP characteristics; 61 to 80 = frequently have impostor characteristics; and higher than 80 = intense IP characteristics.¹³ A cut point of 62 was used to differentiate between impostors and non-impostors.

We chose to measure self-esteem using the Single-Item Self-Esteem Scale (SISE), which has comparable predictive validity and strong convergent validity with the Rosenberg Self-Esteem Scale.¹⁴ Participants answer the single item on a 5-point Likert scale.

Burnout was assessed using the two-item abbreviated Maslach B burnout Inventory (2-item MBI), which assesses two domains of burnout: emotional exhaustion (a state of emotional depletion at work) and depersonalization (a lack of feelings or negative and/or cynical feelings toward others). It's scored on a 0 to 6 Likert scale and a score of >3 for either item indicated burnout. It correlated with the Maslach B burnout Inventory (MBI), with a sensitivity and specificity of 93.6% and 73.0%, respectively.¹⁵

The 4-item Patient Health Questionnaire-4 (PHQ-4) contained the 2-item depression scale (PHQ-2) and the 2-item anxiety scale (GAD-2). It was used to assess depression and anxiety over the past two weeks. The score for each subscale ranged from 0 to 6, while the total score ranged from 0 to 12. For the PHQ-2 and the GAD-2, scores of ≥ 3 reflect depression or anxiety, respectively. The following categories correspond to the total PHQ-4 score: normal (0–2), mild (3–5), moderate (6–8), and severe (9–12).^{16–17}

Frost Multidimensional Perfectionism Scale-Brief (FMPS-B) was used to assess perfectionism. It has eight questions, divided into two subscales: evaluative concerns and strivings. The items were scored on a Likert scale from 1 to 5, for a minimum total score of 8 and a maximum of 40. Higher scores indicated stronger perfectionistic tendencies.¹⁸

To minimize survey fatigue and maximize response rates, short yet validated scales, with the exception of the CIPS, were chosen for this study.

Data Analysis: The data was analyzed using SPSS version 26. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were calculated to summarize socio-demographic characteristics and comorbidities. Bivariate analyses were conducted to explore associations between variables. Comparisons of the CIPS mean score with socio-demographic factors were performed using the Student's t-test and one-way ANOVA, with a significance level of $p \leq 0.05$. Correlations between the CIPS total score and associated factors were assessed using Spearman's rho and Pearson's r coefficients.

A multiple linear regression model was developed to predict impostor phenomenon, with the CIPS mean score as the dependent variable. The independent variables were selected

using stepwise selection method. To avoid multicollinearity between the independent variables, multicollinearity diagnostics tools were used. Multiple models were produced and the best fit chosen based on the R-squared (0.550). An item analysis of the Clance Impostor Phenomenon Scale was also conducted to evaluate its internal structure. Gender differences in individual CIPS items were analyzed using the Chi-square test.

Ethical approval for the study was obtained from the Community Medicine Department at the University of Khartoum. Informed consent was obtained from the students at the beginning of the Google form survey, and no information that could lead to student identification was collected.

Results

The study included 409 students. Their socio-demographics are shown in [Table 1](#). Using 62 as a cut point on the Clance impostor phenomenon scale (CIPS), the occurrence of the impostor phenomenon was found to be **52.8% (216)**. The mean CIPS score was 63.37 (SD = 17.02), with a range of 20 to 100. IP category distribution is shown in [Table 1](#). Of the 216 participants who had IP, 155 (71.8%) were females and 61 (28.2%) were males. Out of the 216 students with IP, 208 (96.3%) were single, 7 (3.2%) were married, and one (0.5%) was divorced. The age category between 19 and 21 had the highest occurrence of IP of 88 (40.7%), while the category between 25 and 30 had the lowest occurrence of IP with only 12 (5.6%) students.

Anxiety and depression were measured using a 4-item PHQ scale; the mean of the total sample was 5.4 ± 3.5 , with a range of 0 to 12. The mean of the 2-item depression scale (PHQ-2) for the total sample was 2.8 ± 1.9 , with a range of 0 to 6. The prevalence of depression among the students was 48.7% (n = 199), and 142 (71.4%) of those depressed were females. The 2-item anxiety scale (GAD-2) had a mean (SD) of 2.6 ± 1.9 , with a range of 0 to 6. Females also had a higher anxiety prevalence in 126 (74.1%) students.

Burnout was assessed using a 2-item MBI scale; the total sample mean was 5.5 ± 3.5 , the range (0–12). The burnout rate was higher in females: 124 (76.5%). For the emotional exhaustion item of the 2-item MBI scale, more than a third of the students had feelings of burnout from the study (39.6%, n = 162). The mean score for this item was 3.2 ± 1.9 , with a range of 0 to 6. On the other item, depersonalization, about 26.9% of the students had feelings of depersonalization (n = 110) with a mean score of 2.3 ± 2 , with a range of 0 to 6. Females also had a higher depersonalization rate of 71.8% (79 students). The prevalence of these comorbidities is shown in [Table 1](#).

The mean of the single-item self-esteem scale for the whole group of students was 2.3 ± 1.1 , with a range of 1 to 5. To the statement: I have high self-esteem, 14.4% of the students described it as not very true of me (n = 59), 19.1% responded as untrue of me (n = 78), 39.1% as neutral (n = 160), 18.3% as true

of me (n = 75), and only 9% responded as very true of me (n = 37).

Upon assessing perfectionism, the mean of the 8-item FMPS-B scale for the total sample was 24.1 ± 6.4 (8 to 40 range). The Evaluative Concerns for the Perfectionism domain had a mean (SD) of 11.08 (3.97). The striving for perfectionism domain had a mean (SD) of 13.06 (4.01). Females had a higher mean of 24.64 (SD = 6.51), compared to males with a mean of 23.02 (SD = 6.06), n = 401 (with 8 students who didn't answer to this question).

The mean for parental overprotection turned out to be 3.26 (SD = 1.18), with a range of 1–5. The responses to the statement: my parents are overprotective were: 9.3% of the students responded strongly disagree (n = 38), 15.6% disagreed (n = 64), 31.1% were neutral (n = 127), 27.6% agreed (n = 113), and 16.4% strongly agreed (n = 67).

We assessed family dynamics using a multiple-choice question where 220 students (53.8% of the total sample) mentioned at least one of the family dynamics, while the other 189 students (46.2%) provided "none of the above" as a response to this question. The family dynamics and their statistics are shown in [Figure 1](#).

This study found a statistical association between IP and gender (p = 0.028) and academic year (p=0.008). The other socio-demographic factors had no statistical association.

Self-esteem, parental over-protection, anxiety, depression, burnout with its two items: emotional exhaustion and depersonalization, and perfectionism with its two subscales (strivings and evaluative concerns) all had a moderate to strong degree of correlation with the total CIPS score (all with p<0.001), as shown in [Table 2](#).

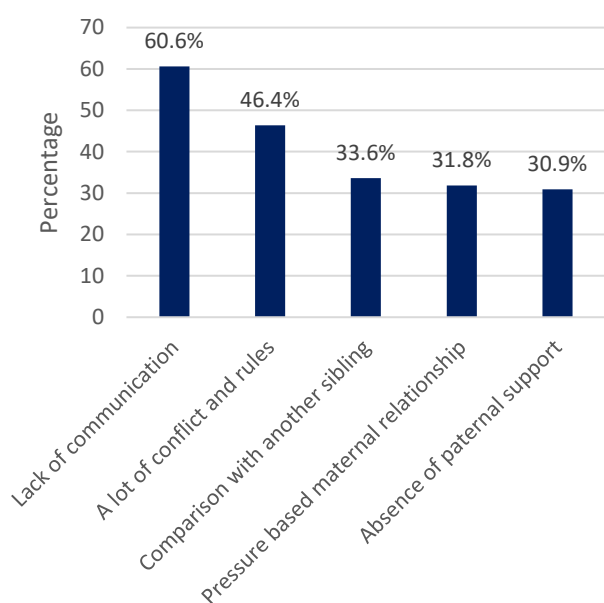
[Table 3](#) shows the multiple linear regression model. The model indicates a significant relationship between the linear combination of the predictors and the IP score, $F(6,394)=80.3$, $R^2 = 0.550$, $p<0.001$. Burnout scale score is a significant predictor, with each unit increase in burnout associated with a 1.32-point increase in the IP score (p<0.001). Conversely, self-esteem shows a negative relationship with IP; for every unit increase in self-esteem, there is a 4.19-point decrease in the IP score (p<0.001). Perfectionism is also a significant positive predictor, with each unit increase in perfectionism associated with a 0.86-point increase in the IP score (p<0.001). Parental overprotection predicts a 2.43-point increase in the IP score for each unit increase in overprotection (p<0.001). Students reporting pressure-based maternal relationships have an IP score that is 3.49 points higher than their counterparts (p=0.028). Additionally, students identified as depressed have a 2.90-point higher IP score compared to those not identified as depressed (p=0.024).

When analyzing the correlation between the total CIPS score and the individual items of CIPS, we found that the scores on

individual CIPS items have a moderate to high degree of correlation with the total CIPS score ($p < .001$ for all items). The item analysis is attached in the **Supplementary Materials**.

We then proceeded, Using the Chi-square test to compare males and females regarding individual CIPS items This revealed differences in the ratings of three items, 1, 14, and 18. Females endorsed all three items more strongly than males. There were no differences in the ratings of the remaining 17 items, as shown in **Figure 2**.

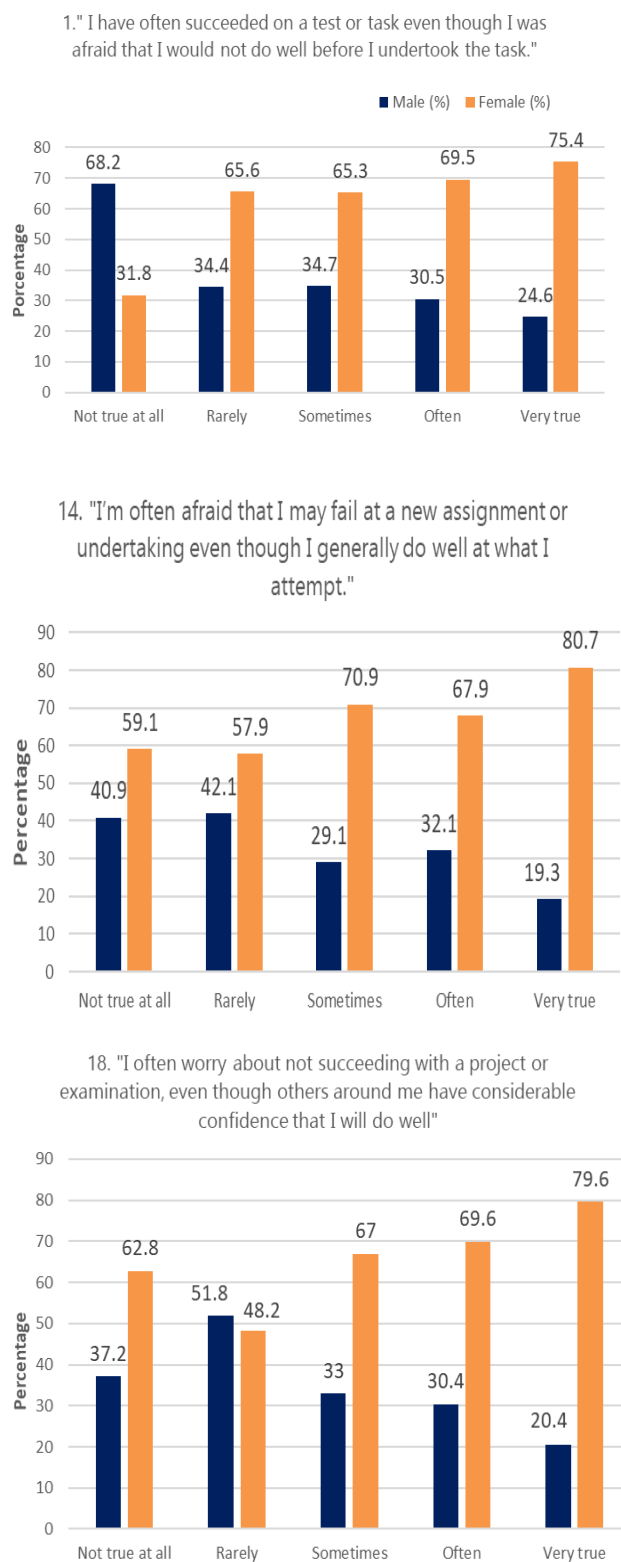
Figure 1. Responses to Family Dynamics Statement (Students Could Provide Up to 5 Responses), $n = 220$.



Discussion

This study investigated the occurrence and factors associated with the impostor phenomenon among medical students of Khartoum University. Most of the study participants were females, 278 (68%). This is similar to Alrayyes S et al. study⁴ and contrasts with the study by J. N. Egwurugwu et al., where the majority were males.⁵ The sample reflects the dominance of females in the study population of the University of Khartoum. The age range was between 17 and 30, which is in line with the study population of both Alrayyes S et al⁴ and J. N. Egwurugwu et al.⁵ Most of the participants were single, 397 (97.1%). Only 11 (2.7%) were married. Of these, ten were female. A low marriage rate of 12% was also reported by J. N. Egwurugwu et al.⁵ IP was found to be highly prevalent, with an occurrence of 52.8%. This is lower than Saudi Arabia's study prevalence (57.8%).⁴ and is higher than the prevalence range reported by Thomas and Bigatti in their systemic review.⁹ Our study participants exhibit high characteristics of IP. 223 (54.6%) of participants had CIPS score more than 61. This is in contrast to J. N. Egwurugwu et al., where participants showed lower characteristics of IP and higher levels of self-esteem.⁵

Figure 2. Distribution of Responses by Gender to CIPS Items 1, 14, and 18 Using the Chi-Square Test.



Legend: For item 1 ($p = .002$), females mean score was 3.9 ± 1 , males mean score was 3.5 ± 1.3 . For item 14 ($p = .014$), females mean score was 3.2 ± 1.4 , males mean score was 2.8 ± 1.3 . For item 18 ($p = .002$), females mean score was 3.6 ± 1.3 , males mean score was 3.1 ± 1.3 .

Table 1: Sociodemographic Factors and Impostor Phenomenon Comorbidities Among Students at the University of Khartoum Faculty of Medicine (n=409).

	Category	Frequency	%
Age group	18 and less	49	12
	19-21	164	40.3
	22-24	167	41.0
	25-30	27	6.6
Gender	female	278	68.0
	male	131	32.0
marital status	single	397	97.1
	married	11	2.7
	divorced	1	.2
Academic year	1 st year (A)	56	13.7
	1 st year (B)	57	13.9
	2 nd year	59	14.4
	3 rd year	56	13.7
	4 th year	59	14.4
	5 th year	62	15.2
Impostor phenomenon (62 as cut point on CIPS)	Yes	216	52.8
	No	193	47.2
Impostor characteristics (CIPS scores)	Intense (>80)	71	17.4
	Frequent (61-80)	152	37.2
	Moderate (41-60)	145	35.5
	Few (40 or less)	41	10
Depression	Yes	199	48.7
	No	210	51.3
Anxiety	Yes	170	41.6
	No	239	58.4
Burnout (Emotional exhaustion)	Yes	162	39.6
	No	247	60.4
Burnout (depersonalization)	Yes	110	26.9
	No	299	73.1

Table 2: Correlations Between CIPS Scores and Self-Esteem, Anxiety, Depression, Burnout, Perfectionism, and Parental Overprotection (n=409).

Factor	Total CIPS score	
	r coefficient	p-value
Self-esteem*	-0.435 (M)	<.001
Anxiety*	0.356 (M)	<.001
Depression*	0.445 (M)	<.001
Total burnout*	0.499 (M)	<.001
burnout from the study*	0.492 (M)	<.001
Depersonalization*	0.380 (M)	<.001
parental over protection*	0.340 (M)	<.001
total perfectionism**	0.538 (S)	<.001
evaluative concerns**	0.641 (S)	<.001
striving for perfectionism**	0.226 (Sm)	<.001

Legend: *using Spearman Rho coefficient; **using Pearson r coefficient
M=Moderate correlation, S= Strong correlation, Sm= Small correlation. All variables have moderate to strong correlations with the total CIPS score except for the striving for perfection domain which has a small degree of correlation (r=.226), (p<.001 for all variables).

Table 3: Predictors of Impostor Phenomenon Among University of Khartoum Faculty of Medicine Students Using Multiple Linear Regression.

variables	Coefficients	p-value	95% Confidence Interval of the coefficients	
			Lower Bound	Upper Bound
(Constant)	37.424	<.001	31.414	43.434
Burnout scale score	1.323	<.001	0.944	1.703
self-esteem	-4.193	<.001	-5.221	-3.165
perfectionism scale	.856	<.001	0.660	1.052
Parental overprotection	2.429	<.001	1.418	3.441
pressure-based maternal relationship	3.496	.028	0.381	6.611
Depressed or not	2.902	.024	0.386	5.418

Legend: The linear combination of the measures was significantly related to the IP score, F(6, 394)= 80.3, p<.001.

The study revealed that a majority of individuals experiencing IP were females, with a significant association between gender and impostor phenomenon (P value = 0.023), a finding consistent with Alrayyes S et al. research. This finding supports the correlation between female gender and IP, but it does not make gender an independent predictor of IP. It is important to note that IP can also affect males, and all individuals should feel encouraged to seek help. Age was not significantly associated with IP ($P = 0.528$). This lack of association may be due to the narrow age range of the participants in this study. Age effects should be addressed in a wider age range to see if IP characteristics dwindle or increase with time.

Regarding the academic year, the mean score for students in the middle years (66.2 ± 15.9) was significantly higher than the mean CIPS score for students in the first years (60.1 ± 17.6) ($p = .008$). Final-year students did not differ significantly from early and middle-year students. This suggests that impostor feelings are more frequent in the middle years of medical school. B. Levant et al. studied IP in third-year students as they transitioned from preclinical to clinical years, and these students had moderate to frequent impostor feelings.¹⁹ In our study, first year medical students had low IP feeling as opposed to a study by Rosenthal et al., where 87% of new students had high or extremely high IP.⁷ This can be attributed to the students feeling highly confident after passing their high school exams, while later development of IP in subsequent years may be due to having lower confidence in the setting of peer pressure and demanding environment of the medical school.

Burnout rates have increased in recent years among both medical students and doctors.⁹ Our study explored two items of burnout: emotional exhaustion and depersonalization (39.6% & 26.9%, respectively), and both items had a positive moderate correlation with CIPS score. These findings suggest that IP may contribute to burnout development. This is congruent with Alrayyes S et al.'s study.⁴

In our study, a high rate of anxiety and depression was reported (41.6% & 48.7% respectively). Both had a positive, moderate correlation with the CIPS score. Since this is a cross-sectional study, we cannot draw a conclusion about causality. It is unclear whether these mental health problems increase the risk of developing IP characteristics, or they are caused by IP.⁴ Regardless, these mental health problems should not be ignored.

The total score of FMPS-B had a strong positive correlation with the CIPS score. The subscale evaluative concerns also had a strong positive correlation with the CIPS score, while the strivings subscale had a low positive correlation. These findings serve to show that perfectionism can be used to predict IP. Similar findings were reported by Klug et al.⁸

Self-esteem was the only factor with a negative correlation with IP. This is also reported in Nigerian medical students.⁵ A study by K. Cokley et al. suggested a model where self-esteem mediates the link between perfectionism and IP.²⁰ This model

and our study findings reflect a way to help prevent those with perfectionistic tendencies from developing IP by increasing their self-esteem.

Another factor addressed in this study was parental overprotection. This was found to have a positive, moderate correlation with the CIPS score. Li, Hughes, and Thu reported this link as well.¹⁰ From the start, family dynamics were included in Clance's study, in which she and Imes coined the term.¹ In our study, while many students reported a lack of communication with their families, it was the pressure-based maternal relationship that had a link with IP. This finding was also endorsed by Li, Hughes, and Thu¹⁰ and explored in T. jeledan's qualitative study.²¹ In Sudan, mothers are commonly known to pressure their children to pursue academics and use peer pressure as means to motivate them.

A regression model was generated to accommodate all the factors correlated with IP and the change in CIPS score with these factors. Pressure based maternal relationship predicted the highest increase in the CIPS score (3.49 units), and self-esteem predicted the highest decrease in CIPS score (-4.19 units). It's noted that while lack of communication was the predominant family dynamic reported by the students, it was the pressure based maternal relationship that had the highest predicting value. The other family dynamics didn't do well when testing the model. This model provides insight to identifying high risk students and also possible solutions to address IP, such as helping students boost their self-esteem and treating depression and burnout.

In this study, an item analysis was also done, and all individual CIPS items had a moderate to high degree of correlation with the total CIPS score. Item six: "I'm afraid people important to me may find out that I'm not as capable as they think I am." And item 13, "Sometimes I'm afraid others will discover how much knowledge or ability I really lack." Had the highest correlation with the CIPS score. item one, "unfounded fear of failure" had the lowest correlation with the CIPS score.

Gender differences among the different CIPS items were studied, and it was found that the ratings of items 1, 14, and 18 differed significantly. Women favored all three items more than men. Item one reflects the unfounded fear of failure; item 14 is about the fear of failing at new assignments; and item 18 shows unfounded worries about succeeding. These findings are different from those of Levant et al., in which items 17 and 18 had a gender difference but were also more endorsed by females.¹⁹ Item 17 is about comparing one's abilities to others. These items can be more endorsed by women because they feel they have more to prove than their male counterparts.

Regarding the limitations of this study, it should be noted that as this is a cross-sectional study, the direction of causality can't be deduced. The relationship between impostor phenomenon and the factors explored in this study is one of association and not causation. This is especially evident with mental health comorbidities. We cannot determine if IP causes these

comorbidities or if the comorbidities caused IP. It should also be noted, that the sampling method used was a convenient non-probability sampling, which may impact the generalizability of the study results to the population at large. This sampling method is known to cause selection bias as only the students who were available at the time could be included in the study. However, to strengthen the results, the sample size was increased from 330 to 409 participants.

The questionnaire was self-administered, which can lead to social desirability bias, especially where mental health problems are regarded. We endeavored to reassure the students about their confidentiality and the anonymity of the questionnaire was stated in the beginning of the questionnaire. It is important to note that the tools used in the questionnaire to assess depression and anxiety, burnout and depersonalization, perfectionism, and self-esteem were all short screening tools, designed to avoid survey fatigue and not intended to reflect actual diagnoses of these factors. Additionally, since this study was conducted using a Google Form, only participants with internet access at the time were included.

In conclusion, this study found that medical students at Khartoum University experience a high occurrence of IP, with gender, academic year, self-esteem, parental overprotection, anxiety, depression, burnout, and perfectionism- all being associated with IP. The regression model included self-esteem and pressure-based maternal relationship, parental overprotection, depression, the emotional exhaustion item of burnout, and the perfectionism scale.

Given the mental and psychological status of the students at the University of Khartoum, preventive measures are necessary. The regression model developed by this study can help identify high-risk individuals. Support groups can be started for students identified by the model, as IP can be very isolating. Mental health problems can be addressed in the university clinic. In addition to solving the associated comorbidities, efforts should be made to address the maladaptive ways of thinking associated with IP.

Further studies should be conducted using probability sampling to ensure the generalizability of the results. To explore causality, research designs other than cross sectional studies may be used. Wider age ranges should be explored in subsequent studies. Gender differences in IP can also be further studied. The effect of IP on medical students and how it impairs their development as doctors is an important avenue that should be explored in depth as it can affect future patient care.

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Summary – Accelerating Translation

Main problem: Impostor phenomenon, imposterism, commonly known as imposter syndrome, is a term used widely in the past few years. It is receiving increasing attention lately, and many people can relate to imposter syndrome.

The term was coined back in 1985 by Clance and Imes in the first study that described the impostor phenomenon in a sample of highly achieving females, which was defined as “an internal experience of intellectual phoniness that those who feel fraudulence and worthlessness despite outstanding academic or professional accomplishment have.” Since then, many studies have explored IP in both genders and among different occupations. The last few years specifically have seen a rise in the papers on the topic, most of which were in the USA. Among the population studied were medical students and doctors. IP was reported by many as a feeling or a state accompanying the medical career, starting from the admissions, through the medical school itself, and passing on to residency. The feeling of not being enough or the feeling of fraudulence described by many in the field despite the evidence of the competency of these individuals has been a source of anxiety, depression, and burnout.

Addressing the impostor phenomenon and helping those in the medical field recognize it and manage it is bound to improve their mental health and general well-being, which is bound to reflect well on their patient care, which is the ultimate goal.

Aim of study: As such, this study was conducted to assess the occurrence of IP among the medical students of Khartoum University in Sudan in 2022. There are few papers on the topic in Africa and the Middle East region, and none in Sudan. This study aims to help fill this gap. This study intends to shed light on the risk factors that contribute to IP. It also seeks to investigate the mental implications of IP on medical students.

Methodology: This was a cross-sectional study conducted at the University of Khartoum, Faculty of Medicine, in Sudan, involving all the students enrolled in the faculty at the time (7 batches, 2334 students). Using convenience sampling, a sample of 409 students was chosen. The data was collected using a Google form. The data were then analyzed using SPSS software.

Results: In the study sample (409 students), impostor phenomenon was found in 216 students (52.8%). It is higher than the prevalence of a study conducted in Nigeria (54.5%).

The students had a moderate to high prevalence of depression, anxiety, and burnout. The impostor phenomenon was associated with gender. IP was more severe in middle-year students. We formed a model to help in predicting IP, and it had the following items: self-esteem, parental overprotection, anxiety, depression, burnout, and perfectionism.

Conclusions: The impostor phenomenon is frequent among medical students at the University of Khartoum and is associated with mental health problems, certain personality traits, and different family dynamics. Efforts to increase awareness and facilitate IP management should be implemented.

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Conflict of Interest Statement & Funding

Ethical approval was taken from community medicine department, University of Khartoum. Consent was taken from the students at the beginning of the Google form. No information leading to the student's identification was taken. As reported in the manuscript.

Author Contributions

Conceptualization: H. K. A. Hamad. Methodology: H. K. A. Hamad. Validation: H. K. A. Hamad. Formal Analysis: H. K. A. Hamad. Data Curation: H. K. A. Hamad. Investigation: H. K. A. Hamad. Resources: H. K. A. Hamad. Writing – Original Draft: H. K. A. Hamad. Writing – Review & Editing: H. K. A. Hamad. Visualization: H. K. A. Hamad. Project Administration: H. K. A. Hamad.

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