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Imposter syndrome in medical students.

Síndrome del impostor en estudiantes de medicina.

Ivan Josué Canales-Gómez [1*]

[1] Department of Health Sciences, Bachelor of Medicine and Surgery, University of the Valley of Atemajac, Zapopan, Jalisco, Mexico. ivan.canales@univa.mx , https://orcid.org/0000-0002-6646-0443 .

[*] Correspondence: ivan.canales@univa.mx

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Abstract. Impostor syndrome (IS) is defined as the inability to internalize one's own achievements, particularly affecting high-achieving populations such as medical students. The objective of this study was to determine the frequency of IS and explore its association with sociodemographic and academic variables. An observational, descriptive, and cross-sectional study was conducted between February and July 2025 in the Medical Surgeon program at the Universidad del Valle de Atemajac (Zapopan, Jalisco, Mexico). The Clance Impostor Phenomenon Scale (CIPS) was administered via online surveys to 140 medical students, along with sociodemographic variables. Data were analyzed using nonparametric tests as the primary analysis and parametric tests as confirmation, reporting effect sizes with 95% confidence intervals and a multiple regression model adjusted for confounders. 85.7% of participants presented some degree of IS, and 43.6% experienced frequent or intense feelings of the phenomenon. No significant differences were found by sex, source of income, or self-perceived academic performance, but a significant association was found between the semester completed and the intensity of the syndrome ($p = 0.021$; $\varepsilon^2 = 0.141$), which remained after adjustment for age, sex, and academic workload. It is concluded that burnout syndrome represents a frequent challenge in medical training, with a prevalence at the upper end of the international range and varying according to the training stage, which supports the need to explore institutional interventions, ideally confirmed through longitudinal studies.

Keywords: imposter syndrome; medical students; medical education; imposter phenomenon; student well-being.

Resumen. El síndrome del impostor (SI) se define como la incapacidad de internalizar los logros propios, afectando especialmente a poblaciones de alto rendimiento como los estudiantes de medicina. El objetivo de este estudio fue determinar la frecuencia del SI y explorar su asociación con variables sociodemográficas y académicas. Se realizó un estudio observacional, descriptivo y transversal entre febrero y julio de 2025 en la Licenciatura en Médico Cirujano de la Universidad del Valle de Atemajac (Zapopan, Jalisco, México). Se aplicó la Clance Impostor Phenomenon Scale (CIPS) mediante encuestas en línea a 140 estudiantes de medicina, junto con variables sociodemográficas. Los datos se analizaron con pruebas no paramétricas como análisis primario y pruebas paramétricas como confirmación, reportando tamaños de efecto con intervalos de confianza del 95% y un modelo de regresión múltiple ajustado por confusores. El 85.7% de los participantes presentó algún grado de SI y el 43.6% experimentó sentimientos frecuentes o intensos del fenómeno. No se encontraron diferencias significativas por sexo, fuente de ingresos ni desempeño académico autopercibido, pero sí una asociación significativa entre el semestre cursado y la intensidad del síndrome ($p = 0.021$; $\varepsilon^2 = 0.141$), que se mantuvo tras el ajuste por edad, sexo y carga académica. Se concluye que el SI representa un desafío frecuente en la formación médica, con una prevalencia que se ubica en el extremo superior del rango internacional y que varía según la etapa formativa, lo que respalda la conveniencia de explorar intervenciones institucionales, idealmente confirmadas mediante diseños longitudinales.

Palabras clave: síndrome del impostor; estudiantes de medicina; educación médica; fenómeno del impostor; bienestar estudiantil.

1. Introduction

Impostor syndrome (IS), originally described by Clance and Imes in 1978, was identified in a study of 150 high-achieving women who, despite objective accomplishments (degrees, honors, and external recognition), persisted in considering themselves intellectual frauds incapable of internalizing their successes (1). IS is defined as a psychological pattern in which competent individuals fail to internalize their achievements, attributing them to external factors while experiencing a persistent fear of being exposed as impostors. Its main characteristics include: a perceived lack of authenticity in success, a differential prevalence and impact on women, and the influence of social stereotypes about female competence (1). Although there is no universally agreed-upon definition, the initial six criteria proposed by Clance have expanded into a constellation of interconnected traits that can manifest variably in each individual: the impostor cycle, perfectionism, superheroism, fear of failure, denial of competence, and fear of success (2).

The etiology of self-esteem is considered multifactorial. One perspective conceptualizes it as a psychopathological manifestation, in which self-esteem could be a clinical expression of underlying mood or personality disorders, such as generalized anxiety, obsessive-compulsive disorder, or depression (3). This work, however, adopts a second, socio-structural perspective, which serves as the theoretical framework guiding the analysis: self-esteem is not understood solely as an individual trait to be overcome, but as a phenomenon shaped by social contexts at multiple levels (4). This model considers the societal level, where threats based on sex, ethnicity, or other characteristics encourage the external attribution of success; the institutional level, where underrepresentation and a lack of role models in elite environments convey a message of non-belonging; and the interpersonal level, where interactions with peers, superiors, and mentors shape the sense of worth and belonging (4). Adopting this framework allows us to interpret the observed associations—particularly those linked to the formative stage—as a reflection of contextual pressures inherent in medical training, and not only as personal vulnerabilities.

Among the main predictive factors identified are minority status, low self-esteem, maladaptive perfectionism, and parenting styles characterized by overprotection or low levels of care. With conflicting evidence, sex and age have also been noted, with a higher prevalence observed in women and young people (2).

Although burnout is a widely documented phenomenon, it lacks a formal medical definition or standardized criteria in diagnostic manuals such as the DSM-5. Despite not being a psychiatric diagnosis, it disproportionately affects high-achieving professionals, particularly in the medical field (5). Studies of physicians reveal that at least a quarter experience burnout frequently or intensely, with a higher prevalence among women, junior physicians, and those in academic settings. The pressure to achieve perfection during medical training places a significant burden of responsibility on students and hinders their ability to take advantage of academic opportunities, making it crucial to raise awareness of its causes, consequences, and management strategies (6).

Strategies to mitigate this include cognitive-behavioral approaches and educational interventions. The 5R framework constitutes a progressive cognitive-behavioral strategy: Recognize the phenomenon and its triggers; Rationalize distorted thoughts in light of evidence of achievements; Reframe the experience to highlight the value of the opportunity and growth; Prepare methodically while avoiding over-preparation; and Repeat deliberately these strategies, given the recurring nature of the syndrome (7).

Educational interventions operate at multiple levels. At the individual level, reflective journaling, cognitive restructuring, and the development of self-awareness are promoted. Among peers, the active search for support and breaking the silence surrounding self-injury are encouraged. At the group level, workshops with self-reflection exercises and collaborative activities are offered, complemented by coaching and structured supervision. At the institutional level, actions focus on raising awareness, implementing comprehensive educational programs, and addressing underlying systemic biases (8). Furthermore, more research is needed to understand the nuanced impact of self-injury and to adapt interventions to the stage of medical education the student is in (8).

This study contributes contextual evidence from a private institution in western Mexico, a setting underrepresented in the literature, and provides effect sizes, confidence intervals, and an analysis adjusted for confounders that allow for the assessment of the magnitude and robustness of the associations. The objective was to determine the frequency of imposter syndrome and explore its association with sociodemographic and academic variables in undergraduate medical students at the Universidad del Valle de Atemajac (UNIVA), Zapopan, Jalisco, Mexico.

2. Methods

An observational, descriptive, and cross-sectional study was designed and conducted between February and July 2025 in the Medical Surgeon Bachelor's program at the Universidad del Valle de Atemajac (UNIVA), Zapopan, Jalisco, Mexico. This report follows the recommendations of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional observational studies. Inclusion criteria were: students enrolled in the Medical Surgeon Bachelor's program at UNIVA during the study period, aged 18 years or older, who agreed to participate by providing informed consent and who completed the questionnaire in its entirety. Incomplete questionnaires were excluded. The final analytical sample consisted of 140 questionnaires. Sampling was non-probabilistic, using continuous inclusion. Data were collected using Microsoft Forms distributed through student groups.

Sample size. Using Cochran's formula adjusted for finite population (population = 340; expected prevalence 50%; precision 6.5%; confidence 95%) a minimum size of 137 students was estimated; the final sample (n = 140) meets this minimum.

Bias control **.** To minimize selection bias, the questionnaire was distributed equally to all groups and semesters during the data collection period. To reduce response bias, the instrument was administered anonymously and self-administered, without identifiers. Social desirability bias, inherent in self-report instruments, and the potential self-selection bias associated with the response rate are addressed in the limitations section.

Tools. A structured instrument was designed in two sections. The first section collected sociodemographic information: age, sex, semester completed, sources of income, weekly hours of work and study, and self-perceived academic performance. The second section used the Clance Impostor Phenomenon Scale (CIPS), which assesses the perception of falsity, the attribution of success to external factors such as luck, and the devaluation of achievements, through its 20 Likert-type items (possible total score range 20–100). Clance's standardized cut-off points were applied: scores ≤ 40 indicate minimal impostor characteristics; 41–60, moderate experiences; 61–80, considerable frequency of impostor feelings; and > 80, intense experiences. In the present sample the instrument showed high reliability (Cronbach's alpha = 0.916; 95% CI 0.894–0.935), consistent with the coefficient of 0.897 reported for the adaptation to Spanish (9).

Data analysis. Data processing was performed using JASP (version 0.95.2 for Apple Silicon). Means, standard deviations, frequencies, and percentages were used. The normality of the CIPS score was assessed using the Shapiro-Wilk test and the skewness and kurtosis indices. Although the total score

approximated a normal distribution, nonparametric tests were adopted as the primary analysis due to the ordinal nature of the items and the small and unequal size of some subgroups (e.g., n = 3 and n = 6), conditions that compromise the robustness of parametric tests. The Mann-Whitney U test and the Kruskal-Wallis test were used. Student's t-test and one-way ANOVA were applied as confirmatory sensitivity analyses. Effect sizes with 95% confidence intervals were reported using resampling (rank-biserial correlation for the Mann-Whitney U test and epsilon-square [ε^2] for the Kruskal-Wallis test). To assess the robustness of the associations to potential confounders, a multiple linear regression model was fitted with the CIPS score as the dependent variable and semester, age, sex, work and study hours, and self-perceived performance as predictors. A p-value < 0.05 was considered statistically significant. Questionnaires incomplete for any of the items were excluded without imputation.

Ethical considerations. The protocol was approved by the Ethics and Research Committee in Health Sciences (Opinion 202501A) and classified as minimal risk, given that it was limited to the application of anonymous surveys. The study was conducted in accordance with the principles of the Declaration of Helsinki and the General Health Law of Mexico (Title Two, Chapter I, Articles 13, 14, 17, and 21). Informed consent was obtained from all participants, and confidentiality was guaranteed through a privacy notice.

3. Results

During the study period, the 340 students enrolled in the Bachelor of Medicine and Surgery program at UNIVA were invited to participate. 140 students responded and completed the questionnaire, representing a response rate of 41.2%. The sample included 94 women (67.1%) and 46 men (32.9%), with a mean age of 21.3 ± 3.5 years, ranging from first-semester students to medical interns. Regarding their perception of academic performance, 86 students (61.4%) rated it as good to excellent. As for their source of income, the majority depended on their parents or guardians (104; 74.3%), 31 (22.1%) were dependent on them and also worked, and 5 (3.6%) were financially independent. Weekly work hours (4.0 ± 4.8) and study hours (7.0 ± 7.5) were recorded. Details are shown in Table 1.

Regarding imposter characteristics, 20 students (14.3%) exhibited few characteristics, 59 (42.1%) moderate experiences, 53 (37.9%) frequent feelings, and 8 (5.7%) intense experiences. Overall, 61 (43.6%) reported frequent or intense feelings. The mean CIPS score was 57.63 ± 14.29 (range 23–89). This is shown in Table 2.

Inferential analysis revealed no statistically significant differences between sex and CIPS score (Mann-Whitney U = 2522; p = 0.25; rank-biserial correlation = −0.15; 95% CI −0.35 to 0.05; median for women = 65 vs. 59 for men). No differences were found by income source (Kruskal-Wallis, p = 0.630; ε^2 = 0.007) or self-perceived academic performance (p = 0.146; ε^2 = 0.039). Sensitivity analysis using parametric tests yielded equivalent conclusions (sex: t, p = 0.238, d = 0.21; income: F, p = 0.799; performance: F, p = 0.098), confirming the robustness of the results.

Conversely, the academic year (semester) showed statistically significant differences in the CIPS score (Kruskal-Wallis, p = 0.021; ε^2 = 0.141; 95% CI 0.092–0.325), with a moderate-to-large effect size corroborated by ANOVA (p = 0.022). No monotonic linear trend was identified across semesters (Spearman ϱ = 0.13; p = 0.12): the highest medians were observed in the fourth semester and in the clinical and professional stages (seventh semester, internship, and social service), while other semesters showed lower values (Figure 1). In the multiple linear regression model (adjusted R^2 = 0.13; p = 0.005), the effect of semester remained significant after adjusting for age, sex, academic load, and performance (p = 0.027). Additionally, age showed an independent inverse association with the CIPS

score (b = −1.58 per year; 95% CI −2.55 to −0.61; p = 0.002), while sex, working and studying hours, and performance were not significant.

Table 1. Sociodemographic characteristics of the participants (n = 140).

Variable	n (%) / mean ± SD
Age (years)	21.3 ± 3.5
Female	94 (67.1)
Male	46 (32.9)
Good-excellent academic performance	86 (61.4)
Economic dependence (parents/guardians)	104 (74.3)
Dependents and workers	31 (22.1)
Financially independent	5 (3.6)
Weekly working hours	4.0 ± 4.8
Weekly study hours	7.0 ± 7.5

FROM: standard deviation.

Table 2. Distribution of imposter syndrome levels according to CIPS.

Level	CIPS Score	n (%)
Few features	≤ 40	20 (14.3)
Moderate experiences	41–60	59 (42.1)
Frequent feelings	61–80	53 (37.9)
Intense experiences	> 80	8 (5.7)

CIPS: Clance Impostor Phenomenon Scale.

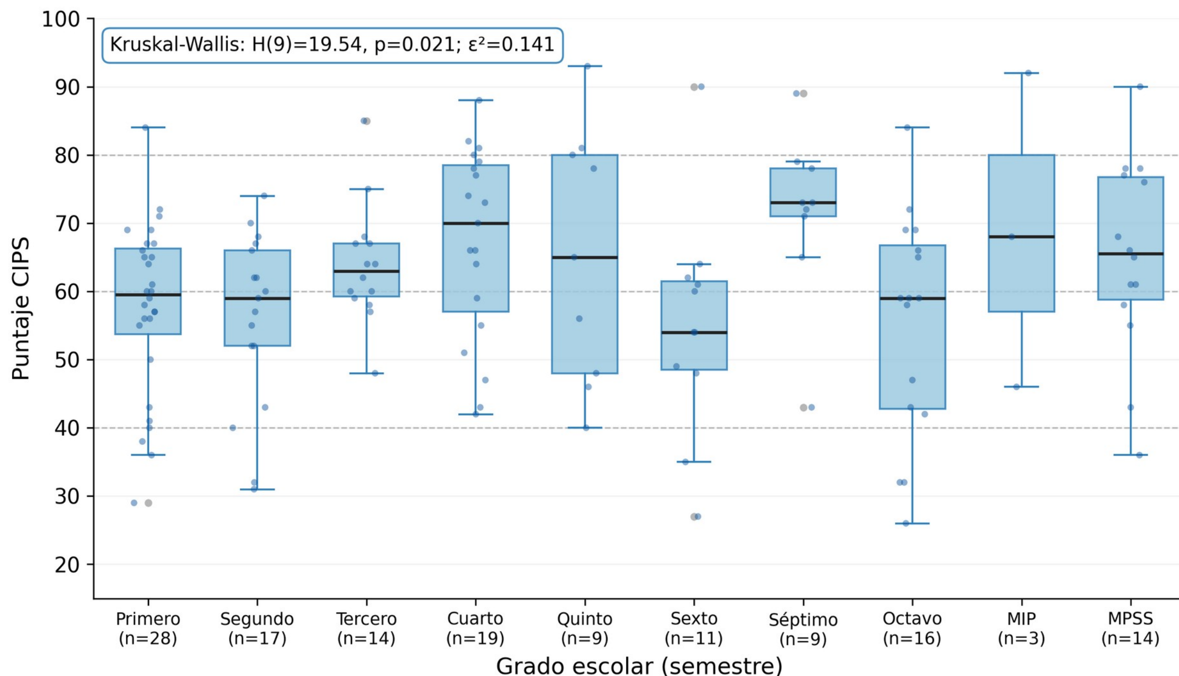

Figure 1. Distribution of scores by semester (n = 140).

Statistically significant differences were observed between semesters (Kruskal-Wallis, p = 0.021; $\varepsilon^2 = 0.141$), without a linear monotonic trend (Spearman $\varrho = 0.13$; p = 0.12). MIP: Medical Intern; MPSS: Medical Intern of Social Service.

4. Discussion

The findings reveal a high frequency of imposter experiences in this population: 85.7% of students reported moderate, frequent, or intense experiences of imposter syndrome. This result is consistent with the international literature, which positions imposter syndrome as a frequent and concerning phenomenon in medical training (10–12). The overall frequency of 85.7% is at the upper end—and even above—the range reported globally (22.5%–88.5%) (13–16). This figure could reflect specific characteristics of the population or the local educational context and should be interpreted in light of the sampling limitations detailed below. Even so, it corroborates that a large proportion of students, despite their evident competence and achievements (61.4% perceived their performance as good or excellent), internalize a persistent self-doubt, a hallmark of imposter syndrome (6).

Contrary to most studies (11–14, 16, 17), no significant differences were found in SI scores between men and women ($p = 0.25$; trivial effect size). While Villwock et al. (17) and Franchi and Russell-Sewell (11) report higher SI scores in women, the present result aligns with that of Negrete Aguilar et al. in Mexico, who also found no differences by sex (18). This divergence should be interpreted with caution: the literature on gender largely comes from Anglo-Saxon contexts, and the expression of SI by sex appears to be modulated by sociocultural factors and the specific educational environment. It is plausible that local systemic factors attenuate the typically observed gender gap, rather than its absence reflecting a universal pattern; therefore, we avoid extrapolating this finding to other contexts.

No significant association was found between self-perceived academic performance and SI ($p=0.146$). Although most students with SI perceived themselves as academically successful, the trend did not reach significance. This reinforces the central concept of SI: the disconnect between performance and the subjective internalization of success (6, 19). This result contrasts with Franchi and Russell-Sewell (11), who found an inverse correlation between performance (ranking) and SI, and with Vilchez-Cornejo et al. (16), who identified satisfaction with performance as a protective factor; the discrepancy could be due to the measurement used (subjective perception versus objective metrics).

Economic dependency did not show a significant association with SI ($p = 0.630$), possibly due to the homogeneity of the sample, most of whom were dependent on their parents. In contrast, the semester completed did show a significant association, with a moderate-to-large effect size ($\varepsilon^2 = 0.141$) that remained after adjustment for age, sex, academic workload, and performance, indicating that this association is not attributable to these confounders. However, the relationship is not a strictly linear increase throughout the degree program (Spearman $\varrho = 0.13$; $p = 0.12$): the highest scores are concentrated in the fourth semester and in the clinical and professional stages (seventh semester, internship, and social service), while other semesters show lower values. This pattern is consistent with the notion of transitional stages as periods of high vulnerability: Villwock et al. (17) and Vilchez-Cornejo et al. (16) associated the start of clinical rotations with higher levels of self-doubt, and Negrete Aguilar et al. (18) found that most residents with self-doubt were in their first year. Rotations and professional practice expose students to real responsibilities with patients, which can exacerbate feelings of inadequacy and self-criticism (19-20). In pedagogical terms, this suggests concentrating psychoeducational support at these transition points—entry, the start of clinical rotations, and the transition to internship and social service—rather than distributing it evenly.

An additional finding from the adjusted analysis is the inverse association between age and CIPS score after controlling for the semester ($b = -1.58$ per year; 95% CI -2.55 to -0.61; $p = 0.002$): at the same educational stage, older students tend to have lower levels of self-efficacy. This result, which should be interpreted with caution due to the cross-sectional nature of the study, could reflect greater maturity or consolidation of self-efficacy and warrants confirmation in future research.

The strong association reported in the literature between self-esteem and mental health problems such as stress, anxiety, and depression (15, 16, 21) underscores the importance of addressing this phenomenon. Rosenthal et al. (10) describe an increase in self-esteem during the first year of medical school, and Tomičević and Lang (21) link it to higher scores for depression, anxiety, and stress.

Among the limitations, the cross-sectional design does not allow for establishing causal relationships. Convenience sampling limits external validity, making the sample's representativeness uncertain and the results not necessarily generalizable to other institutions; despite meeting the calculated sample size, the sample is confined to a single private university in western Mexico. The 41.2% response rate introduces a significant risk of self-selection bias: it is plausible that students more identified with the topic responded in greater numbers, which could overestimate the observed frequency; this bias could not be quantified due to the lack of sociodemographic data for the entire invited population, and it represents an area for improvement in future studies. Finally, the CIPS is a self-report instrument subject to social desirability bias. Therefore, the institutional recommendations derived from this work should be understood as reasonable hypotheses for action and not as interventions validated by the design used.

As areas of opportunity, future studies will consider longitudinal designs and variables such as stress, anxiety, depression, and self-esteem, which will contribute to a more comprehensive understanding of the determinants of self-esteem in this population.

Takeaway message: These results support the value of exploring systemic institutional interventions—curricular psychoeducation, mentoring programs, and a review of the culture of maladaptive perfectionism—focused on transition periods, rather than relying solely on individual resilience. Given the cross-sectional nature of the study, these recommendations should be confirmed through longitudinal designs before large-scale implementation, in order to promote student well-being and develop professionals capable of internalizing their achievements.

5. Conclusions

- 85.7% of students exhibited some degree of imposter syndrome, and 43.6% experienced frequent or intense feelings, placing this population at the upper end of the international range. The semester attended was the only variable with a statistically significant association with imposter syndrome ($p = 0.021$; $\varepsilon^2 = 0.141$), an association that remained after adjusting for confounders; furthermore, age showed an independent inverse relationship. Sex, source of income, and self-perceived academic performance did not show significant differences.
- syndrome is a frequent challenge in medical training, and its intensity varies depending on the training stage, with higher levels around the beginning of clinical rotations and during professional development, without following a strictly linear increase. The coexistence of high levels of imposter syndrome with a self-perception of good performance reinforces the dissociated nature of the phenomenon and its independence from objective achievements.

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