

Impact of Imposter Phenomenon on Medical Learners and Clinicians: A Scoping Review

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Objective: The imposter phenomenon (IP) is the belief that one does not deserve success. Medical students, residents, and physicians experience IP at significant rates, often due to the stress of mastering the extensive diagnostic information and treatment modalities as well as the competitive nature of medicine. We aimed to identify the main factors of IP in medical students, residents, and physicians in the available literature to increase awareness of IP in medical education.

Methods: In this scoping review, PubMed, PsycINFO, Cochrane Library, Embase, Scopus, Web of Science, Google Scholar, Northern Lights Conference Abstracts, and Dissertations & Theses databases were systematically searched for relevant studies published before June 2020. Articles that examined IP in medical students, residents, and attending physicians were retained. References were hand-searched following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach. Extracted data were tabulated to summarize characteristics and main findings from each study. Content analysis of this table identified major themes in the available literature.

Results: Twenty-four journal articles published between 1978 and 2020 were included. Three main themes were identified, including specific demographic characteristics of IP ($n = 14$), the professional impact ($n = 10$), and the psychological impact ($n = 17$) of IP. For demographic characteristics, IP was higher in older individuals ($n = 3$), racial and/or ethnic minorities ($n = 2$), and women ($n = 12$). Married individuals experienced less IP ($n = 2$). For professional impact, IP increased during career transitions or professional challenges ($n = 8$). For psychological impact, IP was associated with reduced self-esteem ($n = 7$), a negative self-concept ($n = 2$), increased self-doubt ($n = 3$), and perfectionism ($n = 3$). Depression, anxiety ($n = 3$), and burnout ($n = 6$) were also heightened with IP.

Conclusion: Results revealed a multitude of factors influencing IP. Increased awareness of the presence, impact, and severity of IP assists medical educators to combat its negative effects. Further research is needed to improve treatments for IP in this population and to better understand the impact of IP on diversity, career trajectory, and career satisfaction in medicine.

Keywords: medical student; imposter syndrome; imposter phenomenon; resident; physician; clinician; medical education; doctor; imposterism; imposter

INTRODUCTION

The imposter phenomenon (IP) is the belief that one does not deserve success. Individuals with IP fear that they will be exposed and those in authority will realize they are not meant to be where they are.¹ This phenomenon is common among many professions, including careers in law, higher education, and finance.² Of key relevance to medical education, medical students, residents, and physicians experience IP at significant rates. About 47.5% of medical students in the study by Qureshi et al.³ were suffering from IP. In addition, 44.7% of medical interns in the study by Mascarenhas et al.⁴ were experiencing IP. This may be due to the stress

of mastering the extensive diagnostic information and treatment modalities, as well as the competitive nature of medicine,^{5,6} which can persist during and after medical training.⁷ Women and minorities also experience some of the highest rates of IP. One study found that the number of women medical students experiencing IP was doubled compared to their male counterparts.^{5,8}

Having feelings of IP has been shown to discourage medical students from pursuing their desired specialties. In particular, challenging specialties with lengthy residencies, such as surgery, exacerbate feelings of inadequacy, thereby leading to a higher risk of IP.⁹ Furthermore, individuals experiencing IP are less likely

to strive for promotions or more competitive job opportunities.¹⁰ Previous literature reviews on this topic commonly mention the impact IP has on mental health.^{11,12} The psychological impacts of IP include burnout, anxiety, and depression.⁶ This in turn has been associated with chronic illnesses, self-perceived poor patient care, inability to function in work and personal lives, and reduced job satisfaction.¹³ This reduced job satisfaction often leads to burnout, which has been shown to play a role in many physicians leaving medicine.¹⁴ Thus, IP impacts initial career choices and may be a factor in physicians deciding to change careers, thereby contributing to physician shortages and lower overall career satisfaction.¹⁵

Additionally, IP may impact diversity and equal representation in medicine. Minority physicians have been shown to provide better care to individuals from shared backgrounds.¹⁶ Shared backgrounds enhance patient care through an improved ability to empathize, build rapport, and foster better communication with patients, thereby leading to increased diagnostic accuracy.¹⁷ Further, women in internal medicine have been shown to have a lower patient mortality and readmission rate compared to their male colleagues. This may be because of the difference in practice patterns between men and women physicians.¹⁸ Thus, without equal representation within medical specialties, patient care may be compromised.¹⁹ Studies have shown that IP may be contributing to this lack of representation. Minorities and women experience IP at an increased rate.^{5,8} These populations may be less likely to pursue certain specialties, thereby causing fewer women and minorities to practice in certain fields,^{20,21} leading to poorer patient care.¹⁹

However, the specific and quantifiable impact of IP on medical professionals remains unclear, including its effects, instances, rates, outcomes, and intervention efforts.²² To address IP, more is needed to determine how IP plays a role in professional development, burnout, and overall career satisfaction.²¹ This scoping review assesses the current literature to identify the common factors and outcomes associated with IP among medical students, residents, and practicing physicians. With this review, we hope to inform future research and guide medical educators to consider interventions.

METHODS

We conducted a scoping review to summarize the available literature on IP in medical settings. We used the methodology outlined by Arksey and O'Malley²³

and Levac et al.²⁴ This methodology is known as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) format.²⁵ Scoping reviews are typically broader in nature as compared to a systematic review, and as such both qualitative and quantitative studies were included, while the relative quality of each study was not rigorously analyzed.^{24,26}

It is critical to note that within the literature, this phenomenon is described as either 'imposter syndrome' or 'imposter phenomenon', with more recent literature using the 'imposter phenomenon' term. Classifying IP as a syndrome relegates it to a diagnostic/disease-focused condition, rather than the social and psychological experience it appears to be.²⁷ To further this nuanced awareness, the present scoping review follows this recent nomenclature, calling it a phenomenon to help dismantle the stigma around IP and shed light on its impact. However, when searching for studies, we included both terms to capture all of the relevant articles on this topic.

Search Strategy

Our search aimed to address the following research question: what are the known factors and outcomes of IP available in the extant literature specifically focused on medical students, residents, and attending physicians? We designed and executed our literature searches in consultation with an information specialist. We systematically searched PubMed, PsycINFO, Cochrane Library, Embase, Scopus, Web of Science, Northern Lights Conference Abstracts, and Dissertations & Theses databases, using the entire available publication histories of each database. Subject headings and keywords included self-efficacy, medical students, internship and residency, physicians, medical education, and medical schools. Additional terms used to refine the search included imposter syndrome, IP, self-concept, professional identity, negative self-talk, and inner critic. A starting year for inclusion was not used, as many of these concepts emerged relatively recently. We hoped to capture the entire history of IP-related concepts. Reference lists of identified articles were also screened for additional studies that were not captured in the initial search.

Study Selection

Studies were included if they met two criteria: a focus on imposter syndrome or IP, and a study population including either medical students, residents, and/or attending physicians. Given limits on language and translation resources,

only publications in the English language were included. Works without a methodology or results section were excluded to facilitate the comparison of findings. Previous systematic or scoping reviews on this topic were also excluded to include only primary data sources, though prior reviews were used to validate our search strategy and hand-sort additional primary sources.^{11,12,21,28-31}

After removing duplicates, the first author applied the inclusion and exclusion criteria to screen titles and abstracts. Studies that met the eligibility criteria were included in a full-text review. The second author assisted the primary reviewer when unclear about inclusion and contributed to the review of the remaining articles. The results and number of articles included at each step of the screening process are described below (see Fig. 1).

Data Charting

Data and findings from each article were extracted and tabulated to better synthesize across studies and generate thematic findings across the sample of articles. Extraction was conducted by the first author and confirmed by a second author through consensus-building and review of materials. Thematic analysis was used to find interesting features and uncover patterns within the data set.^{32,33} Potential themes were identified and then confirmed or refuted through consensus between authors. The findings from the review were formulated and discussed until a consensus was reached. Data demonstrating each theme were then organized into individual tables.

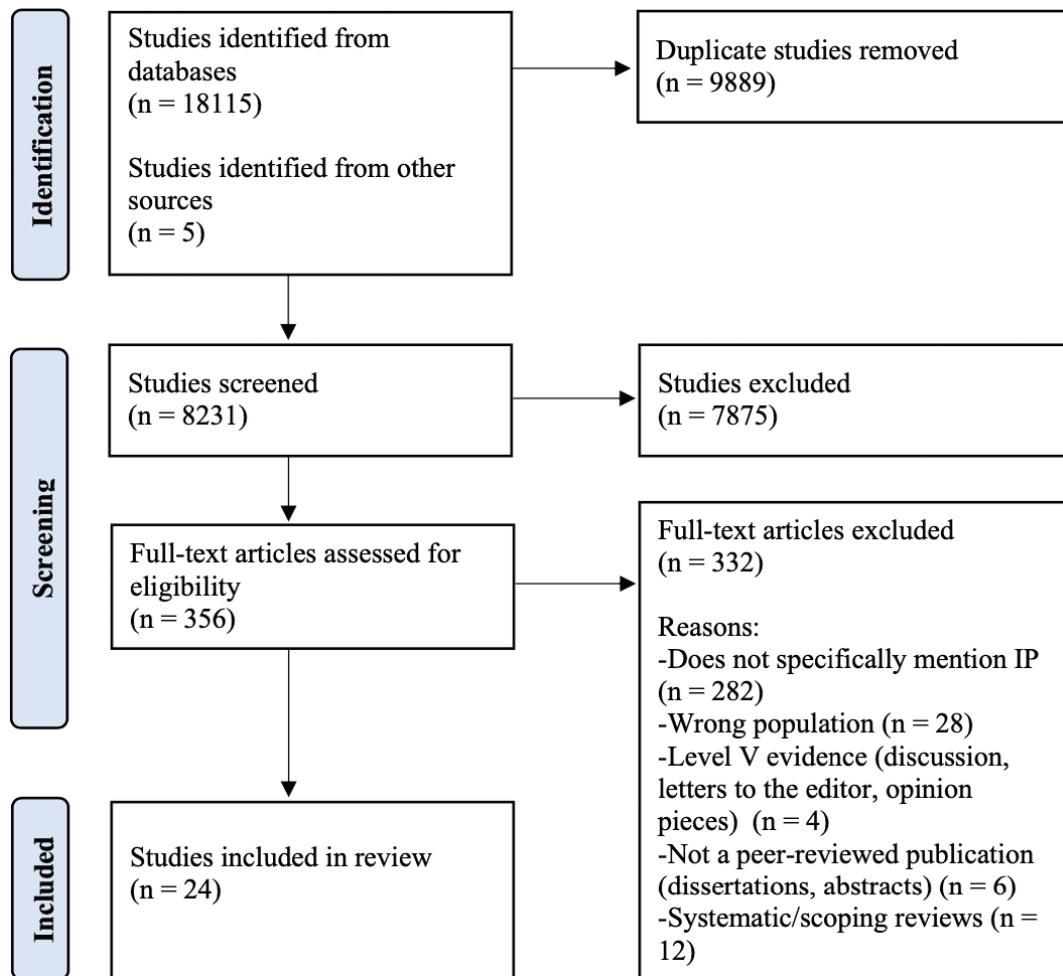


Figure 1. PRISMA Article Screening Diagram.

RESULTS

The PRISMA flow diagram is depicted in Fig. 1.²⁵ Our search yielded 18,115 records from various databases and five articles from scanning references. After removing duplicates and applying the inclusion criteria, 24 articles were included. These were published between 1978 and 2020, with an average publication date of 2014.

In total, 6 of the 24 included studies were qualitative, and 18 were quantitative. The methodology of the qualitative studies were semi-structured interviews, short answer questions, and a case series. The methodology of the quantitative studies were surveys. The Clance Imposter Phenomenon Scale (CIPS)³⁴ was used in 16 studies and the Young Imposter Scale (YIS)⁵ was used in 2 studies to measure IP. The CIPS is a 20-item instrument that uses a Likert-type scale with a 5-point response range. The CIPS is a validated, reliable, and sensitive scale that differentiates those with IP versus those without and it is the most common measure used by researchers and practitioners.^{11,35,36} The YIS is an unvalidated eight-item questionnaire that also assesses feelings of IP. Answering 'yes' to five or more of the questions is considered a positive finding of IP.^{5,11}

In general, the included studies indicated who tended to experience IP, when IP was most often experienced, the mental health consequences, and the persistence of this phenomenon over time. However, no studies directly mentioned how IP influenced the career choice and satisfaction of those within our population experiencing this phenomenon.

After a careful review of these articles, the content and ideas espoused clustered around three main areas. These were treated and developed into themes. These three themes included the demographic characteristics of IP, the professional impact of IP, and the psychological impact of IP. These themes were not mutually exclusive, and some studies spoke to multiple themes. Of the total 24 studies, 14 revealed information about the demographic characteristics of IP (Theme 1; see Table 1), 10 revealed key insights on the professional impact of IP (Theme 2; see Table 2), and 17 revealed insights on the psychological impact of IP (Theme 3; see Table 3).

Demographic Characteristics of Imposter Phenomenon

Of the 14 studies that examined the demographics of IP (see Table 1), 10 focused on medical students, 3 on residents, and 1 on attending physicians. Seven studies were based outside of the United States. The included studies

revealed patterned experiences of IP as a result of different demographic characteristics. These characteristics were sex/gender, marital status, age, and minority status.

First, 11 of the 24 included studies showed that more women experienced IP as compared to men. One study, in particular, found participants believed gender influenced their feelings of self-doubt/IP.²² One participant said, 'As women, we socialize very differently around confidence and incompetence. I think among fellow women residents, I see that they often aren't as confident until they're quite skilled, whereas male residents often are too confident before they actually have the skills.'^{22(p. 765)} This study also found that women may be more likely to talk about these feelings of inadequacy compared to men. For example, another participant said, 'In my experience the men don't speak about it as much, at least with me, and the females do seem to benefit from the sharing of the insecurities or the self-doubts, and I think the reassurance of the shared experience that comes from that.'^{22(p. 765)} In addition, Levant et al.³⁷ cited not only did women have 9% higher IP scores compared to men, but 17% had higher perceived stress scores, which was also correlated with IP ($r_{(64)} = 0.54, p < 0.0001$).

Two out of the 14 studies determined medical students who were married may experience less IP and distress.^{38,39} Egwurugwu et al.³⁸ cited married medical students had higher levels of self-esteem and lower levels of IP compared to their unmarried peers ($p < 0.05$). Henning et al.³⁹ saw that married medical students were less distressed ($r_{pb} = \pm 0.15, p < 0.05$).

Three out of the 14 studies also found that as one ages, their likelihood of experiencing IP increases.^{4,5,40} Holliday et al.⁴⁰ saw IP to be more prevalent in those who were older (years, odds ratio = 1.11, 95% confidence interval = 1.02–1.22). Mascarenhas et al.⁴ also saw that self-esteem was significantly and inversely correlated with age ($r = -0.222$). Similarly, Villwock et al.⁵ found those who were older than 24 years had lower levels of personal accomplishment ($\chi^2_{(2)} = 6.87, p = 0.031$). Low self-esteem and personal accomplishment are both associated with increased feelings of IP.^{4,5,7}

Two out of the 14 studies talked about how IP may be more common among minorities.^{5,41} Villwock et al.⁵ found Asians and whites to have a 30% rate of IP, versus 72.7% in all other races ($\chi^2_{(3)} = 6.87, p = 0.057$). Southgate et al.⁴¹ found that minority participants, in particular those who were the first in their families to become physicians, felt like imposters. For example, one student said

Table 1. Demographic factors of imposter phenomenon

Author/Year/ Country	Country	Population	Study Design	Assessment tool ^a	Participants, <i>n</i>	Key Findings
Clance et al ³⁶ (1978)	USA	Medical students (years unspecified)	Semistructured interview	NA	6	<ul style="list-style-type: none"> Over a 5 year period, 6 women medical students were interviewed. IP experiences were mentioned throughout the interviews.
Egwurugwu et al ³⁸ (2018)	Nigeria	Medical students (All years)	Survey	CIPS	200	<ul style="list-style-type: none"> Married medical students had high levels of self-esteem and lower scores of imposter syndrome compared to their unmarried peers ($p < 0.05$).
Ghorbanshirodi ⁵² (2012)	Armenia	Medical students (All years)	Survey	CIPS	200	<ul style="list-style-type: none"> More women ($r = -0.49$) that had low self-esteem also had IP compared to men ($r = -0.72$).
Henning et al ³⁹ (1998)	USA	Medical students (1st, 2nd, 3rd, and 4th years)	Survey	CIPS	221	<ul style="list-style-type: none"> More women experienced IP than men (37.8% vs. 22% with a $p < 0.001$)
Holliday et al ⁴⁰ (2019)	USA	Medical students (1st, 2nd, 3rd, 4th, and +5th years)	Survey	CIPS	343	<ul style="list-style-type: none"> 11% of men and 18% of women experienced intense IP. In multivariable models, identifying as a woman remained the only independent predictor of intense IP (odds ratio = 1.92, 95% confidence interval = 1.12–3.27). Increased age predicted IP (years, odds ratio = 1.11, 95% confidence interval = 1.02–1.22).
Ladonna et al ²² (2018)	Canada	Attendings	Semistructured interview	NA	28	<ul style="list-style-type: none"> Some participants thought that gender influenced their feelings of self-doubt/IP. They felt that either more women experienced IP or women were more likely to share these feelings.
Legassie et al ⁷ (2008)	Canada	Residents	Survey	CIPS	48	<ul style="list-style-type: none"> Women had significantly higher IP ($t_{45} = -2.2, p = 0.03$).
Levant et al ³⁷ (2020)	USA	Medical students (3rd years)	Survey	CIPS	127	<ul style="list-style-type: none"> Women were more likely to believe themselves as less capable than males on the CIPS ($p < 0.01$, effect size = 0.38). Women expressed more unfounded worrying about succeeding compared to males on the CIPS ($p < 0.01$, effect size = 0.38).

Continued

Table 1. Demographic factors of imposter phenomenon

Author/Year/ Country	Country	Population	Study Design	Assessment tool ^a	Participants, <i>n</i>	Key Findings
Mascarenhas et al ⁴ (2018)	India	Residents (Interns)	Survey	CIPS	150	• Self-esteem decreased as age increased ($r = -0.222$).
Oriel et al ⁵⁰ (2004)	USA	Residents (PGY1, PGY2, PGY3, PGY4)	Survey	CIPS	185	• 41% of women scored as imposters, compared to 24% of men ($p = 0.02$).
Qureshi et al ³ (2017)	Pakistan	Medical students (Final Year MBBS)	Survey	YIS	143	• 68 students (47.5%) had IP. Out of these 45 (53.5%) were women and 23 (38.9%) men.
Southgate et al ⁴¹ (2017)	Australia	Medical students (1st, 2nd, 3rd, 4th, and final year MBBS)	Semistructured interview	NA	21	• Minority/ first-in-family medical students felt that they were imposters and did not 'fit into medicine because it is considered a more elite/ privileged profession.
Villwock et al ⁵ (2016)	USA	Medical students (1st, 2nd, 3rd, and 4th years)	Survey	YIS	YIS	<ul style="list-style-type: none"> • Female gender was significantly associated with IP ($\chi^2_{(3)} = 10.6, p = 0.004$) with 49.4% of women had IP versus 23.7% of men. • Age > 24 years old had significantly lower levels of personal accomplishment ($\chi^2_{(2)} = 6.87, p = 0.031$). • Asians and whites had a 30% rate of IP, versus 72.7% in all other races ($\chi^2_{(3)} = 6.87, p = 0.057$).

^a, CIPS, Clance Imposter Scale; YIS, Young Imposter Scale; NA, Not Applicable.

this, 'Yeah well at first I thought I didn't realize I was good enough to get into something like medicine ... No one in my family has ever done anything like that before ... (H)aving the background I have too, being Aboriginal, you don't really feel like you're entitled to something as good as this.'^{41(p. 250)}

Professional Impact of Imposter Phenomenon

Ten studies investigated the professional impact of IP (see Table 2). The majority of these studies cited high levels of IP during career transitions or new professional challenges ($n = 8$). Such transitions or challenges may include when a first-year medical student begins medical school, a second-year medical student moves onto clerkships, or when a medical student graduates and starts residency. For example, Houseknecht et al.⁴² found that IP did not increase significantly between the M1 and M2 year ($p = 0.061$), but it did significantly

increase at the end of M3 ($p = 0.011$). Maqsood et al.,⁴³ Ikbaal et al.,⁴⁴ Qureshi et al.,³ and Villwock et al.⁵ all determined those in their final year of medical school had more feelings of IP as they prepared for their residency. In addition to these differences in IP throughout the stages of medical training, Ikbaal et al.⁴⁴ determined medical students with high levels of IP to be more likely to quit medical school ($p < 0.001$, odds ratio = 1.98, $\chi^2 = 11.39$).

Feelings of IP were also common among residents and licensed physicians. Leach et al.⁶ found that residents scored significantly higher in regards to IP compared to faculty with a CIPS score of 61 versus 51 and a p -value of 0.017. Brown et al.⁴⁵ cited 62% of incoming fellows were worried about experiencing IP. Additionally, Ladonna et al.²² determined attending physicians experience IP just like those in training, especially when new professional challenges arise.

Table 2. Professional impact of imposter phenomenon

Author/Year/ Country	Country	Population	Study Design	Assessment tool ^b	Participants, <i>n</i>	Key Findings
Brown et al ⁴⁵ (2020)	USA	Fellows	Short Answer Question	NA	64	<ul style="list-style-type: none"> 34 out of 64 (62%) fellows were worried about experiencing IP before even fully beginning their fellowship (62%, <i>n</i> = 34).
Clance et al ³⁶ (1978)	USA	Medical students (years unspecified)	Semistructured interview	NA	6	<ul style="list-style-type: none"> Over a 5 year period, 6 women were interviewed. All had numerous outstanding academic and professional accomplishments, but still experienced feelings of IP.
Houseknecht et al ⁴² (2019)	USA	Medical students (1st, 2nd, and 3rd years)	Survey	CIPS	110	<ul style="list-style-type: none"> IP did not significantly change when compared the beginning of M1 year to the end of M2 year (<i>p</i> = 0.061). There was a significant increase in IP at the end of M3 year (<i>p</i> = 0.011).
Ladonna et al ²² (2018)	Canada	Attendings	Semistructured interview	NA	28	<ul style="list-style-type: none"> Even though the physicians were highly successful and had numerous achievements, feelings of IP persisted. In particular, during transitions or new professional challenges.
Lawton et al ⁴⁶ (2020)	USA	Attendings	Case Series	NA	3	<ul style="list-style-type: none"> All physicians were highly qualified and had experienced managing similar cases, but they were still worried about their competence and whether other physicians would find out how badly they managed a case
Leach et al ⁶ (2019)	USA	Attendings Residents	Survey	CIPS	88	<ul style="list-style-type: none"> Residents scored significantly higher in regards to IP than faculty (61 vs 51, <i>p</i> = 0.017).
Maqsood et al ⁴³ (2018)	Pakistan	Medical students (3rd, 4th, and final year MBBS)	Survey	CIPS	189	<ul style="list-style-type: none"> 64.51% of 3rd year international medical students, 47.36% of 4th year students, and 56.25% of final year students had severe IP.
Ikbaal et al ⁴⁴ (2018)	Malaysia	Medical students (Final Year MBBS)	Survey	CIPS	256	<ul style="list-style-type: none"> Fourth year medical students felt that they were not ready to cope with challenges during their internship years (<i>p</i> < 0.05, ratio = 5.16, $\chi^2 = 4.84$) as compared to non-imposters. Those with IP had significantly stronger intentions of quitting medical school (<i>p</i> < 0.001, odds ratio = 1.98, $\chi^2 = 11.39$)
Qureshi et al ³ (2017)	Pakistan	Medical students (Final Year MBBS)	Survey	YIS	143	<ul style="list-style-type: none"> 47.5% of final year international students had IP.
Villwock et al ⁵ (2016)	USA	students (1st, 2nd, 3rd, and 4th years)	Survey	YIS	138	<ul style="list-style-type: none"> Only the fourth year of medical school was significantly associated with IP ($\chi^2 = 10.5$, <i>p</i> = 0.015).

^b, CIPS, Clance Imposter Scale; YIS, Young Imposter Scale; NA, Not Applicable.

Table 3. Psychological impact of imposter phenomenon

Author/Year/ Country	Country	Population	Study Design	Assessment tool ^c	Participants, <i>n</i>	Key Findings
Egwurugwu et al ³⁸ (2018)	Nigeria	Medical students (All years)	Survey	CIPS	200	<ul style="list-style-type: none"> As self-esteem decreased IP increased in medical students ($r = -0.649, p = 0.002$).
Ghorbanshirodi ⁵² (2012)	Armenia	Medical students (All years)	Survey	CIPS	200	<ul style="list-style-type: none"> Negative correlation ($r = -0.542$) between self-esteem and IP.
Henning et al ³⁹ (1998)	USA	Medical students (1st, 2nd, 3rd, and 4th years)	Survey	CIP	221	<ul style="list-style-type: none"> Medical students' distress was strongly predicted by socially prescribed perfectionism ($r = 0.38, p < 0.001$) and IP ($r = 0.55, p < 0.001$).
Kamarzarrin et al ⁵⁷ (2013)	Iran	Attendings	Survey	CIP	65	<ul style="list-style-type: none"> IP and self-esteem had a significant negative correlation ($r = -0.427, p < 0.01$).
Hu et al ⁴⁹ (2019)	USA	Medical students (1st years)	Survey	CIP	169	<ul style="list-style-type: none"> First year students with maladaptive perfectionism had more feelings of shame/embarrassment (16.3%) and inadequacy (39.5%) than students without maladaptive perfectionism (7.1% and 10.3%, respectively). First year students with high/intense IP had more feelings of shame/embarrassment (22.2%) and inadequacy (29.6%) than students with low to moderate IP (3.5% and 12.2%, respectively). Students with feelings of shame/embarrassment or inadequacy were more likely to have depression symptoms (43.8% and 16.7%, respectively) relative to 3.3% of students who did not report feelings of shame/embarrassment or inadequacy. Those who reported feelings of shame/embarrassment or inadequacy were more likely to have anxiety symptoms (50.0% and 40.0%, respectively) relative to students who did not report feelings of shame/embarrassment or inadequacy (16.3%).

Continued

Table 3. Psychological impact of imposter phenomenon

Author/Year/ Country	Country	Population	Study Design	Assessment tool ^c	Participants, <i>n</i>	Key Findings
Ladonna et al ²² (2018)	Canada		Semistructured interview	NA	28	<ul style="list-style-type: none"> Self-doubt worsened when the physicians had to show that they were confident when they really weren't.
Lawton et al ⁴⁶ (2020)	USA		Case Series	NA	3	<ul style="list-style-type: none"> Self-doubt was a common theme mentioned amongst the physicians experiencing IP in the cases. Physicians who had feelings of self-doubt and IP also had reduced well-being and more features of burnout.
Leach et al ⁶ (2019)	USA		Survey	CIPS	88	<ul style="list-style-type: none"> Symptoms of burnout were significantly higher in those with IP ($p = 0.024$). Only burnout was associated with a higher risk of IP (odds ratio = 3.95, $p = 0.017$).
Legassie et al ⁷ (2008)	Canada		Survey	CIPS	48	<ul style="list-style-type: none"> Three out of the six residents who met the criteria for burnout also scored as imposters.
Levant et al ⁴⁸ (2020)	USA		Survey	CIPS	112	<ul style="list-style-type: none"> High instances of fear and avoidance of evaluation on the CIPS was higher for 3rd year students who responded affirmatively for either burnout (3.30 ± 1.17 for burnout-positive v. 2.56 ± 1.13 for burnout negative, $p < 0.01$) or depersonalization (3.17 ± 1.18 for depersonalization-positive v. 2.80 ± 1.28 for depersonalization negative, $p < 0.05$)
Mascarenhas et al ⁴ (2018)	India		Survey	CIPS	150	<ul style="list-style-type: none"> IP and self-esteem were found to be negatively correlated ($r = -0.519$) Sleep was found to be significantly associated with IP symptoms ($p < 0.001$).
Mir et al ⁴⁷ (2018)	Pakistan		Survey	CIPS	57	<ul style="list-style-type: none"> Negative self-concept is a significant predictor of imposter feelings. This accounted for 8% of the variation in the model.
Ikbaal et al ⁴⁴ (2018)	Malaysia		Survey	CIPS	256	<ul style="list-style-type: none"> IP had a positive correlation with low self-esteem ($\rho = 0.56$), depression ($\rho = 0.42$) and anxiety ($\rho = 0.41$).

Continued

Table 3. Psychological impact of imposter phenomenon

Author/Year/ Country	Country	Population	Study Design	Assessment tool ^c	Participants, <i>n</i>	Key Findings
Oriel et al. ⁵⁰ (2004)	USA		Survey	CIPS	185	<ul style="list-style-type: none"> Those with higher IP had lower self-esteem ($r_2 = -0.63$, $p < 0.0001$). IP was correlated with depression symptoms ($r_2 = 0.45$, $p < 0.0001$), Trait Anxiety ($r_2 = 0.65$, $p < 0.0001$), and State Anxiety ($r_2 = 0.39$, $p < 0.0001$).
Sharpless et al. ⁵¹ (2015)	USA		Short Answer Question	NA	5	<ul style="list-style-type: none"> The medical students mentioned that feelings of IP can make one have more humility and promote self-awareness through critical reflection. This may lead to better emotional resilience and wellbeing.
Southgate et al. ⁴¹ (2017)	Australia		Semistructured interview	NA	21	<ul style="list-style-type: none"> Some participants used self diminishing language when talking about themselves and felt they don't 'fit' into higher education.
Villwock et al. ⁵ (2016)	USA		Survey	YIS	138	<ul style="list-style-type: none"> IP was significantly associated with the burnout components exhaustion ($\chi^2_{(2)} = 5.9$, $p = 0.045$), cynicism ($\chi^2_{(2)} = 9.4$, $p = 0.004$), emotional exhaustion ($\chi^2_{(2)} = 8.0$, $p = 0.018$), and depersonalization

^c, CIPS, Clance Imposter Scale; YIS, Young Imposter Scale; NA, Not Applicable.

Furthermore, Clance et al.,³⁶ Ladonna et al.,²² and Lawton et al.⁴⁶ cited that despite numerous academic and professional achievements, feelings of IP persisted well into practice. For example, one participant in Ladonna et al.²² said, 'The feedback was 'you're the one everyone wants to be the division chair'. I said, 'What? I'm not a leader'. What do they see in me that I don't see in myself?'.^{22(p. 765)}

Psychological Impact of Imposter Phenomenon

Seventeen studies examined the psychological impact of IP (see Table 3). Six studies determined that high levels of IP were associated with reduced self-esteem and confidence. For example, Egwurugwu et al.³⁸ found a significant negative correlation between self-esteem and IP in medical students ($r = -0.649$, $p = 0.002$).

Southgate et al.⁴¹ and Mir et al.⁴⁷ also saw IP to be associated with a negative self-concept. Self-concept is

known as how an individual thinks of themselves.⁴⁷ Southgate et al.⁴¹ cite that some of their participants used diminishing language when talking about themselves – for example, describing themselves as 'bit of a scummo', 'a bit rough around the edges', and 'not very polished', while some other medical students described themselves as 'a different breed', 'pretty clean cut', 'a lot more polished', and 'highly intelligent'.^{41(p. 252)} Mir et al.⁴⁷ also suggest that those with a negative self-concept may be more inclined to experience IP.⁴⁷

Furthermore, Lawton et al.,⁴⁶ Southgate et al.,⁴¹ and Ladonna et al.²² found IP to be associated with increased feelings of self-doubt. Self-doubt is defined as a lack of confidence in one's self and abilities.²² Ladonna et al.²² found that self-doubt and IP worsened when the licensed attending physicians were expected to be confident, but in reality, they were not. They were worried that someday someone would find out that they were a

fraud. For example, one physician explained, 'Many of my colleagues and I often talk about the imposter syndrome and we feel like someone's going to find out that I have absolutely no idea what I'm doing.'^{22(p. 765)}

Burnout also appears connected to IP as seen in six of the included studies.^{4-7,46,48} Burnout is defined as a syndrome that is associated with emotional exhaustion, depersonalization, reduced personal accomplishment, and professional inefficiency.^{6,7} Leach et al.⁶ found that those with IP were significantly more likely to experience burnout ($p = 0.024$) and only burnout was associated with a higher risk of IP (odds ratio = 3.95, $p = 0.017$). In addition to burnout, Mascarenhas et al.⁴ also saw that high levels of IP were associated with a lack of sleep ($p < 0.001$).

Hu et al.,⁴⁹ Ikbaal et al.,⁴⁴ and Oriol et al.⁵⁰ found IP to be related to increased feelings of depression and anxiety. Hu et al.⁴⁹ determined those with high levels of IP were more likely to have feelings of shame/embarrassment (22.2%) and inadequacy (29.6%) than students with lower levels of IP (3.5 and 12.2%, respectively). Furthermore, those who had feelings of inadequacy and shame/embarrassment were more likely to report moderate-to-severe levels of depression (16.7 and 43.8%, respectively, compared to 3.3% of students who do not report feelings of shame/embarrassment and inadequacy) and/or anxiety (40.0 and 50.0%, respectively, compared to 16.3% of students who do not report feelings of shame/embarrassment and inadequacy). Thus, those with IP may be more likely to experience symptoms of depression and anxiety as their feelings of inadequacy and shame/embarrassment increase.

Hu et al.⁴⁹ and Henning et al.³⁹ found that feelings of IP may be related to perfectionism and having both IP and perfectionism can lead to increased distress. For example, Henning et al.³⁹ determined IP ($r = 0.55$, $p < 0.001$) and socially prescribed perfectionism ($r = 0.38$, $p < 0.001$) were the strongest predictors of medical student distress.

Lastly, Sharpless et al.⁵¹ did cite a possible positive impact of experiencing IP. In reflecting on their medical school experience, study participants cited that feeling like an imposter gave them more humility and self-awareness through critical reflection. For example, one participant said, 'Some degree of the 'imposter' feeling will always be impossible to shake; no matter how many my qualifications, there is always someone who may know better. The fact that medicine is a field where

we learn every day also means it is one where we are humbled every day.'^{51(p. 715)}

DISCUSSION

This scoping review identified 24 studies related to IP in medical students, residents, and attending physicians. These studies clustered around three themes that are particularly relevant to and affected by IP: demographic characteristics, the professional impact of IP, and the psychological impact of IP.

Differences by gender,^{3,5,7,22,36,37,39,40,48,50,52} cultural context,⁵² age,^{4,40} marital status,^{38,39} and race^{5,41} were all noted and often significant. In particular, three studies determined that as one ages, their likelihood of experiencing IP increases.^{4,5,40} Age and IP are particularly relevant as the average matriculant age to allopathic medical schools in 2017–2018 was 24 years according to age statistics published by the Association of American Medical Colleges.⁵³ Thus, as the age of the average matriculant goes up, feelings of IP may also become more prevalent. In addition, one study concluded minorities with IP believed they did not 'fit' into medicine because it was considered a more elite or privileged profession.⁴¹ This is a mindset that may contribute to reduced diversity in medicine. Even though this is the case, within this review only two studies were focused on IP among minorities, suggesting further research is needed to better understand how IP relates to the experiences of minorities and how this may potentially contribute to less diversity in medicine.

Many of the included studies that showed a contrast in IP between men and women were done outside of the United States. This finding may also be due to cultural differences regarding gender. How an individual thinks of their successes in relation to their identity may be influenced by the society shaping that identity in the first place.⁵² Thus, some societies may have an increased propensity towards IP. However, cross-cultural comparisons of IP are lacking, particularly as they relate to differences in gender perceptions and roles.

The majority of the included studies mentioned that feelings of IP often surfaced during career transitions or new professional challenges, such as during the transition that happens during the third year. This may be because of the increased pressure to perform now that the students are in the hospital treating patients for the first time during the third year compared to pre-clinical years.⁴² In addition, three studies noted that those in

their final year had more feelings of IP as they prepared for residency.^{3,5,44,45} One study, in particular, hypothesized that this may be because final-year students are about to be in charge of human lives and will have even more demands at work.³ One of the most alarming findings of this review was that those with IP are more likely to quit medical school.⁴⁴ This is why delving more into how medical educators and leaders in a healthcare setting can reduce the amount of IP experienced during career transitions/career challenges may greatly improve career satisfaction and retention outcomes for those at risk.

Numerous studies found IP to be associated with low self-esteem and confidence as well as increased self-doubt and a negative self-concept, often linked to notions of perfectionism and burnout. Mir et al.⁴⁷ suggested that those with a negative self-concept may have a distorted view of how others perceive them. This may lead to feelings of insecurity, inadequacy, failure, and low self-confidence. Thus, this ultimately leads to those with a negative self-concept being more inclined to experience IP.⁴⁷ Perfectionism and IP are also related to increased feelings of distress, anxiety, depression, and burnout.^{4-7,39,44,46,48-50} This drive for perfection causes people to put increased pressure on themselves to perform so that they avoid the negative consequences of being judged or seen as a failure. In those with IP, one of their concerns is that they are inadequate. By attempting to make everything perfect, one is working towards mitigating this factor. This undue pressure that perfectionists with IP put on themselves leads to increased feelings of distress. IP was also found to be heavily associated with burnout.^{4-7,46,48} This might be related to increased feelings of inadequacy and perceived lack of personal accomplishment associated with burnout.⁶ Burnout is a large problem within medicine. One study surveyed general surgery residents and found that 69% met the criteria for burnout and almost half of those who met this criterion considered leaving their program.¹⁴ Early intervention when students begin having these experiences, designing to address IP, perfectionism, and burnout may prove beneficial.

One area of further research is the impact of IP on specialty choice and career satisfaction. We hypothesized that IP would change career trajectories and satisfaction among participants. However, no identified studies specifically examined this in our population. There were two studies that examined career satisfaction and

trajectories within other career paths. Both of these studies determined IP to negatively impact both of these areas of one's career.^{10,54} Career-related outcomes of IP in medical students, residents, and attending physicians still remain unclear. We hypothesize this may be because the individuals within our population may be less likely to express their feelings of IP, thereby leading to less openness about them impacting their ultimate career choice.²² Further research is needed in this specific population to provide more understanding of the professional impact of IP among medical students, residents, and attending physicians. In addition, more research is needed on how IP impacts career trajectories as well as the diversity within specialties, which in turn may be impacting healthcare delivery overall.

Many of the studies included in this scoping review show the professional and psychological impacts of IP if left untreated. However, current medical education needs improvement when it comes to IP education and prevention.²² Medical educators have the opportunity to lessen the impact of IP on their students' careers by implementing changes to the curriculum through mandatory classes on IP and mentoring opportunities field,²¹ access to counseling services for learners,³⁹ and encouragement and acceptance of talk therapy for IP.^{55,56} Together, these strategies may help lessen feelings of IP within our population. Furthermore, multiple studies found that IP was seen less in those who were married.^{38,39} This might suggest that individuals with strong support systems may be less likely to experience IP. Thus, having better support systems in place may help mitigate feelings of IP and the consequences that may result.

One limitation of this study was finding enough relevant articles that met the inclusion and exclusion criteria. An information specialist was consulted to assist with selecting the appropriate databases and MeSH terms to combat this limitation. Heterogeneity among the included studies may be due to differences in the methods used. Some studies were quantitative and others were qualitative in nature. They also used various different scales to determine the extent of IP within their participants. Furthermore, because this scoping review included a mix of qualitative and quantitative study designs, the analysis of those findings was challenging and subject to interpretation, thereby increasing the risk of bias. This necessitated careful review and consensus-building between authors, wherein others reviewing the same material may have summarized, compared, and generated themes differently. Another limitation was that

this review did not have extensive systematic review team. However, the second author assisted the primary reviewer with deciding what articles should be included in the study based on the criteria, thereby increasing the reliability.

CONCLUSION

In conclusion, this scoping review reveals the demographics as well as the potential consequences (psychological and professional) of IP on one's success and well-being in medicine. Further research is needed to fully understand its impact and treatment. We hope that with increased awareness and engagement with IP in medical curriculums, the satisfaction, performance, and diversity across specialties will increase. This would improve patient care, reduce burnout, anxiety, and depression, and provide a more effective educational experience for medical learners and future careers for physicians.

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