

MEDICAL EDUCATION IN REVIEW

Impostor syndrome among physicians and physicians in training: A scoping review

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Abstract

Context: Impostor syndrome (IS) is increasingly recognised as a condition among physicians and physicians in training. Impostor syndrome is especially problematic because of its association with **increased rates of burnout and suicide**. In order to address this issue, we need to fully understand its prevalence, scope, and factors associated with IS. The purpose of this scoping review is to analyse the existing literature on IS among practising physicians and physicians in training in order to identify current trends and directions for future research.

Methods: The authors conducted a literature search of nine databases for any articles on IS among practising physicians or physicians in training published prior to January 2019. Two reviewers independently screened articles and identified **18 papers** meeting the study inclusion criteria. Two authors independently extracted data and performed quantitative and qualitative syntheses consistent with best practice recommendations for scoping reviews.

Results: Most studies utilised the Clance Impostor Phenomenon Scale and cited rates of IS ranging from 22% to 60%. Studies found that **gender, low self-esteem and institutional culture were associated with higher rates of IS**, whereas **social support, validation of success, positive affirmation, and both personal and shared reflections were protective**. Overall, IS was also associated with higher rates of burnout.

Conclusions: This review summarises the existing literature on IS among practising physicians and physicians in training, providing valuable insights and areas for future research.

1 | INTRODUCTION

Impostor syndrome (IS), also known as impostor phenomenon, was first described by Clance and Imes in 1978¹ and is characterised as an inability to internalise success and the tendency to attribute success to external causes such as luck, error or knowing the appropriate individuals.^{1,2} This inability to accept personal or professional success often leads to a sense of fraudulence, also known as impostorism.¹ When considered in the context of Bandura's self-efficacy theory

(ie the belief in one's innate ability to achieve desired goals³), IS may have direct effects on one's sense of self-efficacy and ability to succeed. Given that a low degree of self-efficacy has been demonstrated to influence a variety of outcomes, including both academic success and psychological wellness,³⁻⁶ the need to better understand the scope and depth of IS is crucial.

Although IS was initially reported to occur only in select groups,¹ more recent data have shown that it affects men and women alike, as well as a number of different populations and cultures.⁷⁻¹⁰ Impostor

syndrome is prominent among highly successful individuals^{1,11,12} and up to 70% of people have reported a sense of impostorism at some point during their careers.¹³ In high-performing professionals, this may supply motivation and lead to an increased drive to succeed, which may positively impact the individual's career.¹⁴

However, studies have also linked IS with several negative consequences.^{15,16} For example, Crawford et al¹⁵ linked IS with high levels of emotional exhaustion at work and increased work–family conflict. Individuals with IS also experience higher levels of negative feelings and job dissatisfaction.¹⁶ Following incidences of failure, those with IS are more susceptible to depression and more likely to report feelings of low self-esteem, humiliation, guilt, anxiety and dissatisfaction.¹⁷ Perfectionism and high levels of work-related stress are also associated with IS.¹⁸ Most concerning are the recent links between IS and burnout¹⁹ and suicide.²⁰

Although IS has been well described in other fields, there is relatively limited understanding of this phenomenon within medicine. This is especially problematic because of high expectations and rates of perfectionism,²¹ which put individuals in this field at particular risk for IS. Recent literature highlighted that approximately 67% of practising physicians and 76% of residents are suffering from burnout.^{22,23} Although burnout is associated with many factors, IS has been demonstrated to be a contributor.^{18,19} Given the profound impact of burnout on medicine, understanding IS within the context of physicians and physicians in training is critical.^{24–26}

In order to properly understand the impact of IS within the medical field, we sought to explore IS among the entire spectrum of physician training in subjects ranging from medical students to physicians in practice. Therefore, this study aimed to evaluate all available published studies discussing IS among physicians and physicians in training. Our goal was to describe the prevalence and scope of IS in order to identify current trends and define future areas of research.

2 | METHODS

Scoping reviews are commonly used to: (a) examine the extent, range and nature of research activity; (b) determine the value of undertaking a full systematic review; (c) summarise and disseminate research findings, and (d) identify gaps in the existing literature.²⁷ As such, we conducted a scoping review to summarise and synthesise the existing literature on IS among physicians and physicians in training.

We employed scoping review methodology following best practices set forth by Arksey and O'Malley²⁷ and furthered by Levac et al.²⁸ This included the following stages: (a) identifying the research question; (b) identifying relevant studies; (c) selecting studies; (d) charting the data; (e) collating, summarising and reporting the results, and (f) consultation.²⁷

2.1 | Identifying the research question

The overarching purpose of this review was to map the current literature on IS among practising physicians and physicians in training and

to identify gaps requiring future research. In order to address these goals, we sought to answer the following question: What proportion of studies acknowledge, assess or address IS among physicians and physicians in training? We decided to focus on the continuum of medical professionals (ie medical students, resident physicians and attending physicians) because they represent a unique population in medicine as a result of their extensive and rigorous training, and job roles associated with high levels of stress, perfectionism traits and increased rates of burnout.^{21–26}

2.2 | Identifying relevant studies

In conjunction with an experienced medical librarian, we conducted a search of EMBASE, MEDLINE, CINAHL (Cumulative Index to Nursing and Allied Health Literature), PsycINFO, Web of Science, MedEdPORTAL, Google Scholar, the Cochrane Database of Systematic Reviews and the Cochrane Central Register of Controlled Trials to include citations from inception to 2 January 2019. We used the following Boolean search query for our searches: 'impostor syndrome' OR 'imposter syndrome' OR 'impostor phenomenon' OR 'imposter phenomenon' OR 'impostorism' OR 'imposterism' OR 'impostor experience' OR 'imposter experience'. There were no language or date restrictions. We reviewed the bibliographies of identified studies and review articles for potential missed articles. We also consulted with topic experts to help identify any further relevant studies.

2.3 | Selecting studies

Manuscripts were included if they specifically discussed IS among medical students, resident physicians or attending physicians. Studies that did not discuss IS or did not assess it with respect to medical students, resident physicians or attending physicians were excluded. Two investigators (MG, AK) independently assessed studies for eligibility based on the above criteria. These investigators regularly discussed, by telephone, inclusion and exclusion criteria to clarify any issues or ambiguities as they arose. All abstracts meeting the initial criteria were reviewed as full manuscripts. Studies determined to meet the eligibility criteria on full-text review by both extractors were included in the final data analysis. Any discrepancies were resolved by consensus with the addition of a third reviewer if needed. Our initial search strategy identified 162 articles, of which 18 were duplicates, resulting in a total of 144 articles for analysis (Figure 1). No new articles were identified via a search of the grey literature or in discussion with topic experts. Twenty-seven articles were excluded based on title or abstract. A total of 117 articles were reviewed in full and 18 manuscripts were found to meet the study inclusion criteria.

2.4 | Charting the data

We utilised the 'descriptive–analytic' model described by Arksey and O'Malley for data extraction and summarisation.²⁷

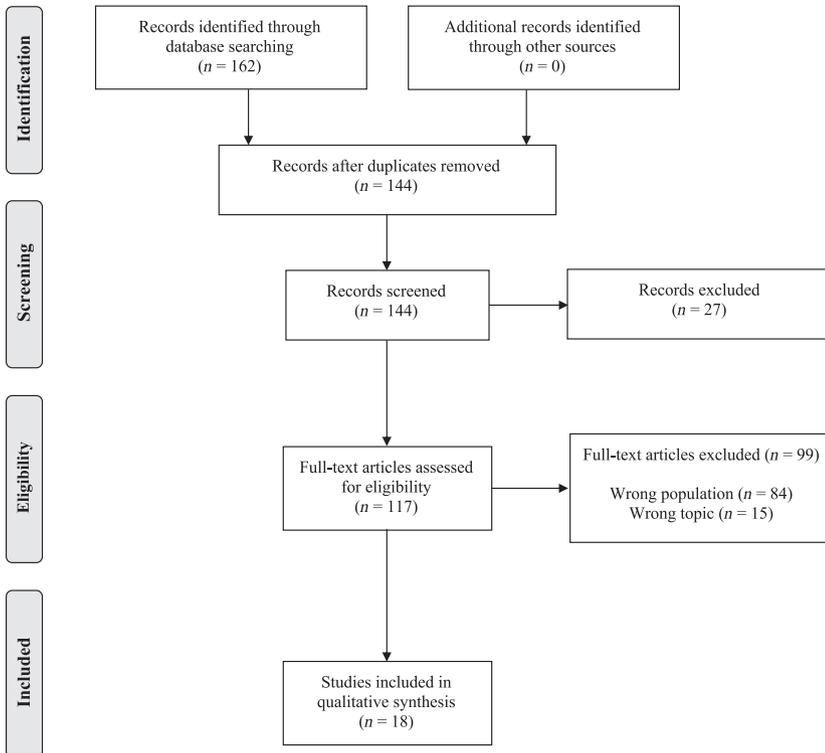


FIGURE 1 Search strategy outcomes and numbers of papers assessed

Two investigators (NB, AC) independently extracted data from the included studies. The investigators underwent initial training and extracted data into a predesigned data collection form in Microsoft Excel (Microsoft Corp). These investigators regularly discussed extraction categories to clarify any issues or ambiguities as they arose. As recommended by best practice guidelines,²⁷ we extracted general information about each study, including the author, year of publication, study type, specific study population, study or article location, purpose and main findings.

We sought to understand the following sub-themes:

1. What is the prevalence of IS among these populations?
2. What factors contribute to IS in this population?
3. What factors protect against IS in this population?
4. To what extent does IS directly contribute to physician burnout?

2.5 | Collating, summarising and reporting the results

We synthesised and collated the data, performing both a quantitative and a qualitative analysis. For the quantitative portion, we included a descriptive numerical summary of the extent, nature and distribution of the studies included in this review. For the qualitative analysis, we provided a narrative review of the current information addressing our aforementioned study questions with an emphasis on the implications in a broader context as recommended by Levac et al.²⁸ Finally, we concluded by discussing areas for future research.

2.6 | Consultation

In order to ensure this review appropriately reflected the available knowledge, and that we had interpreted it appropriately, we consulted with five external physicians at various stages of their careers with topic expertise in wellness and IS. Feedback was sought and incorporated as appropriate. An example of this refers to the discussion of different IS assessment scales. These findings and recommendations were endorsed by our key informants.

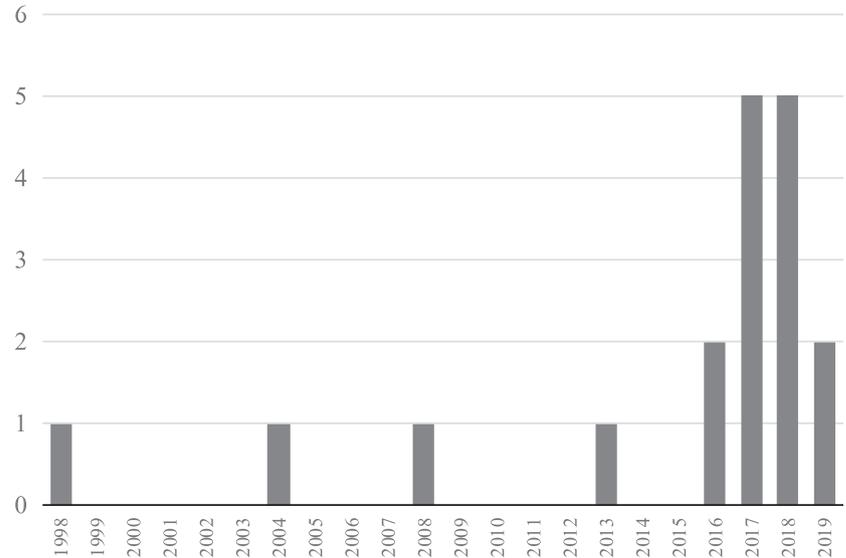
3 | RESULTS

Of the identified studies, the majority were published after 2016 (Figure 2). Ten studies had been conducted in the USA,^{19,29-37} two in Canada,^{14,38} two in Pakistan,^{39,40} and one in each of India,⁴¹ Iran,⁴² Malaysia⁴³ and Nigeria⁴⁴ (Table 1). Eight studies involved medical students,^{19,29,32,34,39,40,43,44} four involved resident physicians,^{30,37,38,41} and seven involved attending physicians.^{14,33,35-38,42} Thirteen were survey studies,^{19,29,30,32,36-44} two were qualitative studies,^{14,33} two were perspective articles^{34,35} and one was a narrative review.³¹

3.1 | Prevalence of IS in this population

Eleven of the studies included in our analysis used the Clance Impostor Phenomenon Scale (CIPS) to determine prevalence,^{29,30,32,36-38,40-44} whereas only two used the Young Impostor Scale (YIS).^{19,39} Studies evaluating the prevalence of IS in medical students showed rates ranging from 22% to 60%.^{19,29,32,39,40,43,44} The few studies focused on

FIGURE 2 Number of publications on impostor syndrome per year



resident trainees found rates ranging from 33% to 44%.^{30,38,41} None of the studies evaluated rates of IS among attending physicians in practice.

3.2 | Factors contributing to IS in this population

Gender and unconscious bias may represent a contributing factor in the propensity toward IS, with women at higher risk than men.¹ Some studies showed a statistically significant difference in rates of IS between male and female medical students^{19,29,39} and residents,^{30,38} whereas others found no difference.^{32,37,41,43,44} There were no data available for attending physician populations. One study found that CIPS scores were increased among resident physicians in comparison with those in attending physicians.³⁷ Several studies found that medical students and residents with low self-esteem reported higher levels of IS.^{30,41-44} Perfectionism was also associated with increased risk for IS.²⁹ The literature also suggests that the hierarchy in medical education and the overall culture of medicine may perpetuate feelings of IS, as asking for help and not knowing the answer can be interpreted as signs of weakness in these environments.^{14,33}

3.3 | Factors protecting against IS in this population

Few studies examined protective factors against IS. One study looking at coping mechanisms for IS among medical school faculty members found that social support, validation of success, positive affirmation and institutional support helped to alleviate symptoms of IS, whereas avoidant coping strategies were only partially successful in doing so.³³ Two studies in our review described personal reflections and shared common experiences as means of normalising feelings of IS.^{34,35} Another study recommended a combination of individual and system-level changes.³¹ Individual changes included keeping a record of successes and positive feedback, celebrating accomplishments, and seeking mentors and sponsors.³¹ Institutional changes included having workshops on IS, developing mentorship and support programmes, and fostering a culture that does not punish mistakes.³¹

3.4 | Correlation of IS with physician burnout

Burnout is defined by high levels of emotional exhaustion and depersonalisation and a low sense of personal accomplishment. One study in residents showed no correlation between IS and burnout.³⁸ This study also noted that senior residents exhibited higher levels of burnout and lower feelings of IS in comparison with more junior residents.³⁸ Despite this, the majority of studies demonstrated that feelings of IS were associated with increased rates of anxiety, depression and burnout.^{19,30,36,37,43} Impostor syndrome was also correlated with increased levels of emotional exhaustion, depersonalisation and cynicism, as well as decreased rates of job satisfaction.^{19,36}

4 | DISCUSSION

All of the studies included in our review suggest that there are high rates of IS among medical students, resident physicians and attending physicians. Despite the high prevalence, we found remarkably few studies directly focused on this topic in our populations of interest and most studies had been conducted in more recent years. Although IS was first described over 40 years ago,¹ the majority of the literature examining its impact and prevalence among physicians was not published until 2016. The increased attention to IS as a subject of research can possibly be attributed to the increased focus on physician well-being and mental health awareness, as well as the investigation of factors contributing to the development of burnout.²⁴⁻²⁶ This is further reflected in the number of studies we found that attempted to find associations between IS and burnout, anxiety and depression.^{19,30,36,37,43}

The majority of the studies described IS in medical students. This is perhaps not surprising given that medical school is a critical time of personal and professional development as a physician in training. Studying medical students, especially in their transition phases, is advantageous as we know that IS tends to recur in times of transition.¹⁴ Any period of successful growth inevitably involves

TABLE 1 Summary of findings from the included studies

Study	Country	Population	Medical specialty	Study type	Assessment tool	Participants, n	Major findings
Henning et al (1998) ²⁹	USA	Medical students	NA	Survey	CIPS	477	<ul style="list-style-type: none"> 30.2% of the students had clinically significant IS (total CIPS score ≥ 62) Clinically significant IS was more common in women than men (37.8% vs 22%; $P < .001$) Mean CIPS score was higher in women than men (57.8 vs 52.1; $P < .001$) Perfectionism and IS were strongly associated with greater risk for distress ($r = .38$ and $r = .55$, respectively)
Oriel et al (2004) ³⁰	USA	Resident physicians	Family practice	Survey	CIPS	185	<ul style="list-style-type: none"> 33% of resident physicians had clinically significant IS (total CIPS score ≥ 62) IS was more common in women than men (41% vs 24%; $P = .02$) IS was correlated with depression ($r = .45$), trait anxiety ($r = .64$), state anxiety ($r = .39$) and low self-esteem ($r = .63$)
Legassie et al (2008) ³⁸	Canada	Resident physicians	Internal medicine	Survey	CIPS	48	<ul style="list-style-type: none"> 43.8% of resident physicians had clinically significant IS (total CIPS score ≥ 62) IS was more common in women than men (52.0% vs 31.8%) IS was more common in foreign than Canadian medical graduates (85.7% vs 35.9%) Mean CIPS score was 61.2 Mean CIPS score was higher in women than men (65.2 vs 56.4; $P = .03$) IS was not correlated with burnout (P-value not provided)
Kamarzarrin et al (2013) ⁴²	Iran	Attending physicians	Multiple	Survey	CIPS	65	<ul style="list-style-type: none"> Mean CIPS score was 45.0 IS was correlated with low self-esteem ($r = .427$) The correlation between IS and self-esteem was stronger in women than men ($r = .432$ vs $r = .416$; $P < .05$)
Seritan & Mehta (2016) ³¹	USA	NA	NA	Narrative review	NA	NA	Review of some of the existing literature on IS; no original data
Villwock et al (2016) ¹⁹	USA	Medical students	NA	Survey	YIS	138	<ul style="list-style-type: none"> 38% of students had IS IS was more common in women than men (49.4% vs 23.7%; $P = .004$) IS was associated with emotional exhaustion ($\chi^2 = 8.0$; $P = .018$), cynicism ($\chi^2 = 9.4$; $P = .004$) and depersonalisation ($\chi^2 = 10.3$; $P = .006$)
Hutchins & Rainbolt (2017) ³³	USA	Attending physicians	ND	Qualitative	NA	16	<ul style="list-style-type: none"> Four specific incidents that triggered faculty staff impostor experiences: questioning expertise, experiencing successes, comparison with and among colleagues, and scholarly productivity Four distinct coping mechanisms used to disrupt the impostor cycle: social support, validation of success, maladaptive behaviours, and positive affirmation Perceived needs and resources around institutional support: mentoring, small group discussions, and stress management training
Koven (2017) ³⁵	USA	Attending physician	NA	Perspective/commentary	NA	NA	Perspective article on the influence of gender on IS
Qureshi et al (2017) ³⁹	Pakistan	Medical students	NA	Survey	YIS	143	<ul style="list-style-type: none"> 47.5% of students had IS IS was more common in women than men (53.5% vs 38.9%)
Russell (2017) ³⁴	USA	Medical student	NA	Perspective/commentary	NA	NA	Perspective article on IS in medical school
Swope et al (2017) ³²	USA	Medical students	NA	Survey	CIPS	85	<ul style="list-style-type: none"> 50% of students had significant IS 10.4% had very severe IS Mean CIPS score was 63.7 No difference in IS between females and males ($P = .13$) No difference in IS between first- and second-year students ($P = .624$)
Egwurugwu et al (2018) ⁴⁴	Nigeria	Medical students	NA	Survey	CIPS	200	<ul style="list-style-type: none"> 22.5% of students had clinically significant IS (total CIPS score ≥ 60) Mean CIPS score was similar in women and men (46.1 vs 47.7; $P = .45$) Positive correlation with low self-esteem ($r = .65$)

(Continues)

TABLE 1 (Continued)

Study	Country	Population	Medical specialty	Study type	Assessment tool	Participants, n	Major findings
Hutchins et al (2018) ³⁶	USA	Attending physicians	ND	Survey	CIPS	310	<ul style="list-style-type: none"> IS was correlated with emotional exhaustion ($r = .41$ in sample 1 and $r = .47$ in sample 2) and negatively correlated with job satisfaction ($r = -.30$ in sample 1 and $r = -.28$ in sample 2) Avoidant coping strategies only partially mediated these relationships
Ikbaal & Salim Musa (2018) ⁴³	Malaysia	Medical students	NA	Survey	CIPS	256	<ul style="list-style-type: none"> 45.7% of students had clinically significant IS (total CIPS score ≥ 62) Clinically significant IS was similar in women and men (44.2% vs 48%; $P = .644$) Mean CIPS score was similar in women and men (60.3 vs 62.4; $P = .14$) Positive correlations between IS and low self-esteem ($r = .56$), depression ($r = .42$) and anxiety ($r = .41$)
LaDonna et al (2018) ¹⁴	Canada	Attending physicians	Multiple	Qualitative	NA	28	<ul style="list-style-type: none"> Self-doubt variably affects clinicians at all career stages IS can recur, especially during times of transition IS influences how feedback is received
Maqsood et al (2018) ⁴⁰	Pakistan	Medical students	NA	Survey	CIPS	189	54.5% of students reported having significant IS and 4.8% having very severe IS
Leach et al (2019) ³⁷	USA	Attending physicians and resident physicians	General surgery	Survey	CIPS	88	<ul style="list-style-type: none"> Mean CIPS score was 58.2 Mean CIPS score was higher in resident physicians than attending physicians (61 vs 51; $P = .017$) IS symptoms were correlated with burnout (OR: 3.95; 95% CI 1.27-12.27; $P = .017$) IS symptoms were not correlated with female gender (OR: 1.44; 95% CI 0.47-4.43; $P = .525$)
Mascarenhas et al (2019) ⁴¹	India	Resident physicians	Internal medicine	Survey	CIPS	150	<ul style="list-style-type: none"> 41.3% of resident physicians had clinically significant IS (total CIPS score ≥ 62) Mean CIPS score was 57.87 and was similar in women and men ($P = .11$) IS was moderately correlated with low self-esteem ($r = .519$)

Abbreviations: CI, confidence interval; CIPS, Clance Impostor Phenomenon Scale; IS, impostor syndrome; NA, not applicable; ND, not described; OR, odds ratio; YIS, Young Impostor Scale.

navigation of the gap between what the learner can do and what the learner cannot do.⁴⁵ However, we also know that if this gap is navigated in the initial stages of medical school without guidance and support, self-doubt and low self-esteem may develop and consequently predispose the learner to the development of IS later in his or her training and career.

In addition to acquiring new knowledge and skills, a second type of growth also occurs in medical school: professional identity formation, which is the complex and iterative process by which a learner transforms from simply acting like a physician to becoming one.⁴⁶ In circumstances in which this process faces repeated obstacles, feelings of impostorism might develop. We found several studies describing a higher prevalence of IS in women, which may be explained by the historical notion that women do not become physicians, which, in turn, presents a greater challenge to their healthy professional identity formation compared with that in men. The health care systems and stereotypes associated with women (eg that women are nurses) within those systems may also contribute to the higher rates of IS reported among women.⁴⁷ Although none of the studies in our review explicitly addressed under-represented minorities, studies outside the field of medicine suggest that IS is more prevalent in minority groups.^{8,9,48} Although the reasons why women and minority groups exhibit

higher rates of IS are inconclusive, the fact that we are observing greater prevalences of IS among minority groups is cause for concern. Unfortunately, there remains a scarcity of literature on the influences of sex, gender, race and ethnicity on the development of IS and it is essential to better understand these populations if we hope to mitigate IS and its associated effects among physicians moving forward.

The development of IS as a medical student and resident physician can have long-term effects given its association with symptoms of anxiety, depression, emotional exhaustion and depersonalisation.⁴⁹ Shanafelt et al have clearly demonstrated the detrimental consequences of burnout in the medical field.²⁴⁻²⁶ Better understanding of the relationship between IS and burnout may positively impact our ability to prevent physician burnout. Another concern in this group is the role IS may play in developing and fostering physicians' career paths. Medical students, residents and even attending physicians may be reluctant to pursue career opportunities that place them at risk of being exposed as a 'fraud' even if they are competent for the position by objective criteria.⁵⁰

The majority of the literature that focuses on quantifying IS refers to studies conducted among physicians in training. Further studies are necessary to evaluate IS among attending physicians and to determine the influence of practice experience on IS.

Moreover, in order to ensure data are represented appropriately, we must utilise accurate and reliable tools. A recent review of the literature on the validation of assessment tools identified several potential tools for measuring IS (eg the CIPS, Harvey Impostor Scale, Perceived Fraudulence Scale and Leary Impostor Scale), but found that most studies suffered from poor methodological quality and did not reliably report the salient psychometric properties of these tools.⁵¹ Additionally, none of these tools have been validated for use within the medical profession. Therefore, a future area of research should concern the evaluation of assessment tools to ensure they are reliable and accurate in order to best measure the trends and impacts of interventions on IS.

Beyond examining the numbers, there is also a significant need to better understand IS and how it has evolved within the medical field. Studies that focus on the identification of risk factors for physicians and physicians in training who develop IS, as well as whether certain traits are protective, represent one way forward.

Some have suggested that IS is a double-edged sword in that certain physicians may benefit from a degree of impostorism because it increases their drive to succeed, whereas others are directly inhibited by it.¹⁴ This may explain the greater prevalence of IS in highly successful individuals and why this continues to perpetuate within these fields.¹³ It is possible that there may be a 'healthy level' of impostorism which is associated with increased drive and career success, as well as a threshold at which guilt, anxiety, burnout and inhibition of the internal drive occur. As LaDonna et al¹⁴ highlight, IS can impact feedback conversations, which can indirectly impede a learner's growth and development. Gathering data about how the relationship between the level of IS relates to objective measures of clinical competence could help facilitate discussions about IS when engaging in feedback dialogues. Further studies could also focus on ways in which people may be utilising their impostorism to succeed in order to identify factors associated with those who are able to effectively utilise IS for career advancement.

Finally, there is a need to determine which interventions are effective in lowering symptoms of impostorism or converting IS into a tool for success. Several studies discussed potential interventions at both the individual and system levels,^{31,33-35} but these must be prospectively evaluated to determine their effectiveness. Future research should also seek out preventive strategies and early interventions to prevent initial feelings of impostorism from developing into more severe cases of IS.

4.1 | Limitations

It is important to consider several limitations with respect to the current review. First, although we sought to be as thorough and inclusive as possible, our study is limited by the use of nine particular search engines. It is possible that additional papers may have been identified if different search engines had been utilised. Additionally, we restricted our study to material involving only physicians and physicians in training. We believe this is important to understand IS within the medical profession. However, this also results in a narrower focus and may not

reflect IS in other health care providers. Finally, our review was conducted to January 2019 and it is possible that additional studies may have been published since. However, we are not aware of any new literature that has been published during that interval.

5 | CONCLUSIONS

Impostor syndrome is a phenomenon that is increasingly recognised within the medical profession. This scoping review summarises the existing literature with respect to its prevalence, causes and potential interventions. We intend this to be a starting point for those interested in better understanding this phenomenon among physicians in training and practising physicians, as well as a nidus for future research.

CONTRIBUTORS

MG and AK conceptualised the study. All authors designed the study methodology and performed the data screening and analysis. All authors directly contributed to the drafting of the manuscript and to its critical revision. All authors approved the final manuscript for submission and have agreed to be accountable for all aspects of the work in ensuring its accuracy and integrity.

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CONFLICTS OF INTEREST

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ETHICAL APPROVAL

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REFERENCES

1. Clance PR, Imes SA. The imposter phenomenon in high achieving women: dynamics and therapeutic intervention. *Psychotherapy*. 1978;15(3):241-247.
2. Clance PR, O'Toole MA. The imposter phenomenon: an internal barrier to empowerment and achievement. *Women Ther*. 1987;6(3):51-64.
3. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*. 1977;84(2):191-215.
4. Bandura A, Pastorelli C, Barbaranelli C, Caprara GV. Self-efficacy pathways to childhood depression. *J Pers Soc Psychol*. 1999;76(2):258-269.
5. Bandura A, Barbaranelli C, Caprara GV, Pastorelli C. Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child Dev*. 2001;72(1):187-206.
6. Stajkovic AD, Luthans F. Self-efficacy and work-related performance: a meta-analysis. *Psychol Bull*. 1998;124(2):240-261.
7. Topping ME, Kimmel EB. The imposter phenomenon: feeling phony. *Acad Psychol Bull*. 1985;7(2):213-226.
8. Sturges D. Imposter phenomenon and underrepresented minorities: what physician assistant educators need to know. *J Physician Assist Educ*. 2018;29(2):126-128.
9. Bernard DL, Hoggard LS, Neblett EW. Racial discrimination, racial identity, and impostor phenomenon: a profile approach. *Cultur Divers Ethnic Minor Psychol*. 2018;24(1):51-61.
10. Chae JH, Piedmont RL, Estadt BK, Wicks RJ. Personological evaluation of Clance's imposter phenomenon scale in a Korean sample. *J Pers Assess*. 1995;65(3):468-485.
11. Bernard NS, Dollinger SJ, Ramaniah NV. Applying the Big Five personality factors to the impostor phenomenon. *J Pers Assess*. 2002;78(2):321-333.
12. Borhart J. Imposter syndrome: you are not alone. *Emerg Med News*. 2015;37(6):1-24.
13. Gravois J. You're not fooling anyone. *Chron High Educ*. 2007;54(11): A1.
14. LaDonna KA, Ginsburg S, Watling C. 'Rising to the level of your incompetence': what physicians' self-assessment of their performance reveals about the imposter syndrome in medicine. *Acad Med*. 2018;93(5):763-768.
15. Crawford WS, Shanine KK, Whitman MV, Kacmar KM. Examining the impostor phenomenon and work-family conflict. *J Manage Psychol*. 2016;31(2):375-390.
16. Cowman SE, Ferrari JR. 'Am I for real?' Predicting impostor tendencies from self-handicapping and affective components. *Soc Behav Pers*. 2002;30(2):119-125.
17. Thompson T, Davis H, Davidson J. Attributional and affective responses of impostors to academic success and failure outcomes. *Pers Individ Diff*. 1998;25(2):381-396.
18. Rohrmann S, Bechtoldt MN, Leonhardt M. Validation of the impostor phenomenon among managers. *Front Psychol*. 2016;7:821.
19. Villwock JA, Sobin LB, Koester LA, Harris TM. Impostor syndrome and burnout among American medical students: a pilot study. *Int J Med Educ*. 2016;7:364-369.
20. Lester D, Moderski T. The imposter phenomenon in adolescents. *Psychol Rep*. 1995;76(2):466.
21. Peters M, King J. Perfectionism in doctors. *BMJ*. 2012;344:e1674.
22. Rotenstein LS, Torre M, Ramos MA, et al. Prevalence of burnout among physicians: a systematic review. *JAMA*. 2018;320(11):1131-1150.
23. Lin M, Battaglioli N, Melamed M, Mott SE, Chung AS, Robinson DW. High prevalence of burnout among US emergency medicine residents: results from the 2017 National Emergency Medicine Wellness Survey. *Ann Emerg Med*. 2019;https://doi.org/10.1016/j.annemergmed.2019.01.037. [Epub ahead of print]
24. Dyrbye L, Shanafelt T. A narrative review on burnout experienced by medical students and residents. *Med Educ*. 2016;50(1):132-149.
25. Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med*. 2012;172(18):1377-1385.
26. Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clin Proc*. 2015;90(12):1600-1613.
27. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19-32.
28. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*. 2010;5:69.
29. Henning K, Ey S, Shaw D. Perfectionism, the impostor phenomenon and psychological adjustment in medical, dental, nursing and pharmacy students. *Med Educ*. 1998;32(5):456-464.
30. Oriel K, Plane MB, Mundt M. Family medicine residents and the impostor phenomenon. *Fam Med*. 2004;36(4):248-252.
31. Seritan AL, Mehta MM. Thorny laurels: the impostor phenomenon in academic psychiatry. *Acad Psychiatry*. 2016;40(3):418-421.
32. Swope K, Thompson BM, Haidet P. Imposter phenomenon across the span of medical training. *J Gen Intern Med*. 2017;32(Suppl 2):S223.
33. Hutchins HM, Rainbolt H. What triggers imposter phenomenon among academic faculty? A critical incident study exploring antecedents, coping, and development opportunities. *Hum Resource Dev Int*. 2017;20(3):194-214.
34. Russell R. On overcoming imposter syndrome. *Acad Med*. 2017;92(8):1070.
35. Koven S. Letter to a young female physician. *N Engl J Med*. 2017;376(20):1907-1909.
36. Hutchins HM, Penney LM, Sublett LW. What imposters risk at work: exploring imposter phenomenon, stress coping, and job outcomes. *Hum Res Dev Q*. 2018;29(1):31-48.
37. Leach PK, Nygaard RM, Chipman JG, Brunsvold ME, Marek AP. Impostor phenomenon and burnout in general surgeons and general surgery residents. *J Surg Educ*. 2019;76(1):99-106.
38. Legassie J, Zibrowski EM, Goldszmidt MA. Measuring resident well-being: impostorism and burnout syndrome in residency. *J Gen Intern Med*. 2008;23(7):1090-1094.
39. Qureshi MA, Taj J, Latif MZ, Rafique S, Ahmed R, Chaudhry MA. Imposter syndrome among Pakistani medical students. *Ann King Edw Med Univ*. 2017;23(2):107-111.
40. Maqsood H, Shakeel HA, Hussain H, et al. The descriptive study of imposter syndrome in medical students. *Int J Res Med Sci*. 2018;6(10):3431-3434.
41. Mascarenhas VR, D'Souza D, Bicholkar A. Prevalence of impostor phenomenon and its association with self-esteem among medical interns in Goa, India. *Int J Community Med Public Health*. 2019;6(1):355-359.
42. Kamarzarrin H, Khaledian M, Shooshtari M, Yousefi E, Ahrami R. A study of the relationship between self-esteem and the impostor phenomenon in the physicians of Rasht city. *Eur J Exp Biol*. 2013;3(2):363-366.
43. Ikbaal M, Salim Musa N. Prevalence of impostor phenomenon among medical students in a Malaysian private medical school. *Int J Med Stud*. 2018;6(2):66-70.
44. Egwurugwu JN, Ugwueze PC, Ohamaeme MC, et al. Relationship between self-esteem and impostor syndrome among undergraduate medical students in a Nigerian university. *Int J Brain Cogn Sci*. 2018;7(1):9-16.
45. Vygotsky LS. *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press; 1978.
46. Cruess RL, Cruess SR, Boudreau D, Snell L, Steinert Y. A schematic representation of the professional identity formation and socialization of medical students and residents: a guide for medical educators. *Acad Med*. 2015;90(6):718-725.

47. Rogus-Pulia N, Humbert I, Kolehmainen C, Carnes M. How gender stereotypes may limit female faculty advancement in communication sciences and disorders. *Am J Speech Lang Pathol.* 2018;27(4):1598-1611.
48. Cokely K, McClain S, Enciso A, Martinez M. An examination of the impact of minority status stress and imposter feelings on the mental health of diverse ethnic minority college students. *J Multicult Counsel Dev.* 2013;41(2):82-95.
49. Cohen MJ, Kay A, Youakim JM, Balaicuis JM. Identity transformation in medical students. *Am J Psychoanal.* 2009;69(1):43-52.
50. Neureiter M, Traut-Mattausch E. An inner barrier to career development: preconditions of the imposter phenomenon and consequences for career development. *Front Psychol.* 2016;7:48.
51. Mak KKL, Kleitman S, Abbott MJ. Impostor phenomenon measurement scales: a systematic review. *Front Psychol.* 2019;10:671.

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