

Impostor Phenomenon in Health Science Students: Prevalence, Impact, and Intervention

Isha Hariname^a, Kelley Graydon^a, Grace Nixon^a, Peter Carew^a, and Dani Tomlin^a

^aUniversity of Melbourne, Australia

Abstract

University students are experiencing increasingly high levels of psychological distress globally, presenting a significant concern for students as well as universities. Numerous stressors contribute to psychological distress, including impostor phenomenon (IP). The extent, impact and management strategies of IP in university students are less explored in the literature. This study measures the prevalence of IP in graduate health science students, its association with self-efficacy, and evaluates the impact of an educational workshop designed to address it at an Australian university. First, anonymous surveys assessing IP, self-efficacy and demographic information were collected from 115 graduate health science students. Subsequently, a 90-minute workshop on IP awareness and coping strategies was delivered to Master of Clinical Audiology students, with a post-workshop assessment. Our findings showed 77% of graduate health science students had high levels of IP, and students with higher levels of IP had lower levels of self-perceived efficacy. A significant reduction in levels of IP was observed immediately following workshop participation. The findings of this study highlight the pervasiveness of IP among graduate health science students and demonstrate the potential of educational workshops as an effective short-term management strategy.

Editors

Section: Student Experience
Senior Editor: Dr Sally Ashton-Hay
Associate Editor: Dr Miriam Sullivan

Publication

Submission: 9 July 2025
Revised: 20 May 2026
Accepted: 27 July 2026
Online First: 9 August 2026

Copyright © by the authors, in its year of first publication. This publication is an open access publication under the Creative Commons Attribution [CC BY-ND 4.0](#) license.

Practitioner Notes

1. Practitioners are encouraged to acknowledge the presence of IP in university students.
2. Practitioners are advised to acknowledge the role of socio-cultural environment in students' experience of IP.
3. Practitioners are encouraged to consider integrating educational workshops as a management strategy against IP in their educational settings.
4. Researching long-term impact of educational workshops would be valuable to strengthen interventions addressing IP.

Keywords

Impostor phenomenon; student self-efficacy; graduate education; health science students; health professional education

Citation:

Hariname, I., Graydon, K., Nixon, G., Carew, P., Tomlin, D. (2025). Impostor phenomenon in health science students: prevalence, impact, and intervention. *Journal of University Teaching and Learning Practice*, 23(3). <https://doi.org/10.53761/1ym0fa47>

Introduction

Psychological distress among university students has far-reaching implications, impacting their ongoing physical and mental health, academic success, and completion rates, presenting challenges for students, universities, and workforce planners (Deasy et al., 2016; Stallman, 2010). Numerous studies over the past decade have reported increasing levels of psychological distress among university students in Australia (Leahy et al., 2010; Oftedal et al., 2024). Stressors identified by students include challenges in balancing university workload with work, social and personal commitments, managing time effectively, financial stress, concerns about future career prospects, and the increasingly recognised impostor phenomenon (IP) (Henning et al., 1998; Logan & Burns, 2023). Further mental health stressors that are unique to international students include acculturative stress, feelings of isolation, and reduced social support; potentially increasing their risk of experiencing mental health challenges (Browne et al., 2017; Forbes-Mewett & Sawyer, 2011). Given the complexity and multifaceted nature of student experiences, addressing specific stressors could help improve their well-being at university.

IP is a psychological construct that is marked by persistent feelings of intellectual fraudulence despite clear evidence of success (Clance & Imes, 1978). Individuals experiencing IP fear being exposed as a “fraud” and often attribute their achievements to external factors such as luck or systemic errors (Oriel et al., 2004). Due to persistent feelings of self-doubt, students with IP often procrastinate or overprepare for achievement-based tasks, which may intensify stress related to time management and university workload, factors previously identified as significant contributors to psychological distress (Clance & Lawry, 2024). Although IP is not listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) or in the International Classification of Diseases (ICD-10), it is associated with mental health disorders such as anxiety and depression (Garba et al., 2024).

Socio-cultural context plays an important role in the manifestation and maintenance of IP (Clance & Lawry, 2024). Personal demographics such as gender, racial background, and international graduate status have the potential to significantly influence the experience of IP. A meta-analysis on IP and gender differences has reported that female-identifying individuals have higher levels of IP than male-identifying individuals, a finding supported by numerous other studies (Henning et al., 1998; Price et al., 2024; Villwock et al., 2016). Research has identified that IP is prevalent among African American, Asian American, and Latino/a American university students, though direct comparisons with other racial or ethnic student groups were not conducted (Cokley et al., 2013; Cokley et al., 2017). Although research comparing levels of IP among domestic and international students is limited, international medical graduates were reported to have higher levels of IP than their domestic counterparts (Legassie et al., 2008). Individuals belonging to these groups are often underrepresented, lack role models, and face systemic biases, which potentially intensifies their experience of IP (Chakraverty, 2020).

IP has been consistently reported among students across various academic levels, from high school to graduate students, spanning diverse fields of study including healthcare, psychology and liberal arts (Bravata et al., 2020). Research has shown that IP is particularly prevalent in healthcare disciplines, such as medical, dental and nursing fields, likely due to their rigorous academic requirements and high-stakes clinical environments (Henning et al., 1998; Holliday et al., 2020; Legassie et al., 2008; Oriel et al., 2004; Villwock et al., 2016). Metz et al. (2020) reported

that dental students' IP experiences were particularly salient during examinations and clinical placements, when their knowledge and clinical skills were being assessed. Although health science courses are typically academically intensive, with practical examinations and clinical placements, only a small body of literature has explored IP among this student group. Preliminary findings, based on responses from over a thousand graduate students across health science programs, indicate a significant IP prevalence of about 70% (Anderson et al., 2023).

Across healthcare and broader university students, higher levels of IP are associated with greater psychological distress, stronger intentions to quit their courses, and lower confidence in their academic abilities (Cokley et al., 2015; Henning et al., 1998; Ikbaal et al., 2018). Lower academic self-concept has also been linked to greater academic disengagement (Cokley et al., 2015). Self-efficacy, closely related to confidence, refers to an individual's belief in their ability to successfully perform a task (Bandura, 1977). Self-efficacy is considered a reliable predictor of academic achievement and persistence (Bartimote-Aufflick et al., 2015). A small body of research has reported negative associations between IP and students' academic self-efficacy skills, such that students who experienced higher levels of IP had lower self-efficacy, which then contributed to reduced intentions to persist in their programs (Batur et al., 2024; Jöstl et al., 2012; Pákozdy et al., 2023; Tao & Gloria, 2018). Thus, to improve student academic engagement and success, developing interventions aimed at enhancing self-efficacy and reducing the impact of IP is crucial.

Recent scoping reviews exploring IP interventions categorised them into group-based or individual approaches (Para et al., 2024; Siddiqui et al., 2024). Individual approaches, mainly trialled in non-healthcare fields, involves one-on-one coaching or implementing personal strategies. Individual strategies reported in the literature include journalling, record keeping, seeking mentorship, and maintaining physical reminders of success (Siddiqui et al., 2024). Group-based interventions, which are common within healthcare fields, involve workshops that acknowledge IP collaboratively and equip participants with strategies to combat it. Both scoping reviews highlighted heterogeneity in intervention methodologies and evaluation methods. For example, Siddiqui et al. (2024) reported that out of the 17 included studies, only eleven studies assessed the interventions' impact on IP, with eight measuring post-intervention outcomes exclusively, and three lacking clear evaluation timeframes. Nevertheless, group-based workshops that integrate individual coping techniques demonstrate potential in addressing IP.

The aims of this study are two-fold. First, to measure the extent to which graduate health science students experience IP. Second, to pilot and evaluate a workshop-based intervention designed to address IP in a subsample of Audiology students at an Australian university. In addition, this study aims to explore the association between IP and students' self-efficacy skills, and to identify any potential differences in levels of IP across student attributes including gender, international vs domestic student status, age, student marks and study year.

Method

This cross-sectional study was conducted in two phases. The first phase involved measuring the prevalence of IP and self-efficacy skills among graduate health science students enrolled at a large, research-intensive Australian university using an online survey. In the second phase, Audiology students participated in a workshop-based intervention and completed the same survey as a post-workshop assessment to explore the efficacy of the intervention. This study was approved by the University of Melbourne Human Ethics Research Committee (Project ID 29882).

Phase 1

Participants

All graduate students enrolled in the School of Health Sciences at The University of Melbourne were invited to participate in this study. Students were enrolled in one of the entry-to-practice health science Master level courses offered at the school: Audiology, Optometry, Physiotherapy, Speech Pathology, Nursing, or Social Work. Students at all year levels were eligible to partake in the survey. Invitations to participate were distributed via announcements on student learning portals by course coordinators at the start of the second semester in 2024. The survey was available online for six weeks, and participants were able to complete it at their convenience.

Measures

The student facing survey collected information from participants related to IP, self-efficacy and demographic information. It included three components: the Clance Impostor Phenomenon Scale (CIPS), the Employable Skills Self-Efficacy Survey (ESSE), and a demographic questionnaire. The CIPS is a validated measure of IP, featuring 20 items assessing clinically observed IP characteristics, rated on a 5-point Likert scale (1 = not at all true to 5 = very true) (Clance, 1985). The CIPS is designed to yield a total score, with higher scores indicating greater severity of IP experiences. The total CIPS score ranges from 20 to 100, and are categorised into four levels based on Clance's original guidelines: few impostor characteristics (scores of 40 or less), moderate IP experiences (scores 41-60), frequent impostor feelings (scores 61-80) and intense IP experiences (scores higher than 80) (Clance, 1985). This scale demonstrates good internal consistency, with Cronbach's alpha values ranging from 0.85 to 0.96 (Mak et al., 2019).

The ESSE is a validated measure of self-efficacy across four employable skills: communication, analytical inquiry, collaboration and professional development (Ciarocco & Strohmetz, 2018). The survey comprises of 51 items rated on a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree). The scale produces separate scores for each subscale and demonstrates high internal consistency (Cronbach's alpha values from 0.66 to 0.87).

The demographic questionnaire included six questions relating to gender, international versus domestic student status, age, weighted average marks (WAM) as a measure of general academic achievement, study year and a question identifying audiology students for pre- and post-workshop comparisons. All students had access to their WAM on the university's online portal and were instructed to consult this if needed.

Procedures

The online survey was hosted on Qualtrics (qualtrics.com). A summary of the project was provided at the start of the survey, along with a link to a plain language statement further explaining the project. Participants were then guided to a consent form, and the survey proceeded only after consent was provided.

Phase 2

Participants

All students enrolled in the Master of Clinical Audiology course were invited to participate in a workshop-based intervention through an announcement on the student learning portal. A total of 151 first year and second year Audiology students were invited early in the second semester in 2024. Audiology students were selected as a convenience sample because the authors hold teaching roles in this course and were therefore able to integrate the workshop-based intervention into existing classes. This approach is supported by evidence that entry-to-practice health science courses share similar structural features based on professional standards and accreditation requirements, and that students' academic experiences tend to be broadly similar across these disciplines within the Australian educational context (Brown et al., 2011; McAllister & Nagarajan, 2015).

Workshop design

The workshop design was informed by the current literature on IP (Rivera et al., 2021). The workshop design and learning objectives are detailed in Table 1. A 90-minute workshop was designed with 30-minutes of content delivery and 60 minutes of interactive activities. The theoretical content included an introduction on IP, its impact, and literature-based strategies for addressing it, and the interactive activities involved group discussions, self-reflection activities and case discussions. Cases were developed from literature-based scenarios where health science students commonly experience IP, including clinical placements and examinations (Appendix 1).

Procedures

The workshops were facilitated by the authors in this study. The session began with an anonymous online discussion exploring students' understanding of IP to facilitate open discussions. This discussion was hosted on Poll Everywhere (polleverywhere.com). Once an introduction was provided, participants engaged in discussions about their personal experiences with IP in groups of 4-5, which were shared anonymously in a larger online discussion hosted on Padlet (padlet.com). In the segment addressing IP, the facilitators shared their personal strategies for coping with IP, which created a safe and supportive environment. Participants were also encouraged to share their strategies. University resources available to students such as psychological support and academic skill development services were shared with the participants. Finally, post-workshop evaluation was conducted immediately after the session ended. To facilitate pre- and post-workshop comparisons while ensuring anonymity, each Audiology student was assigned an anonymised identifier code after completing the pre-workshop survey. This code, which students were instructed to retain, enabled the pairing of pre- and post-workshop responses.

Data Analysis

Analyses were conducted using Minitab, version 21.4. Descriptive statistics were used to estimate the prevalence of IP. CIPS scores were interpreted and categorised as per the author guidelines (Clance, 1985). The ESSE domains were totalled and scored using the authors' criteria (Ciarocco

& Strohmetz, 2018). Associations between IP and self-efficacy were explored using bivariate correlations. Further, comparisons between IP and demographic variables were conducted using 2-sample t-tests and ANOVA. Pre-workshop and post-workshop responses were compared for participants with matching identifiers using dependent sample t-tests. To determine if any demographic variables were associated with changes in IP scores following the workshops, a general linear model was used to compare demographic variables with pre- and post-workshop CIPS scores.

Table 1

Workshop Lesson Plan

Time required	Learning Activity	Learning objectives
0 – 5 minutes	Workshop introduction Discuss learning objectives	
5-10 minutes	Introduction to IP: Open-ended responses on “what is IP?” Open-ended responses on “could you guess the % of people experiencing IP?”	Understand and define IP Normalise talking about IP symptoms Recognise feelings of IP in self and others
10-20 minutes	Definition of IP: Brief history & groups most impacted by IP Prevalence of IP in health science students Negative self-talk examples	Recognise IP in a sociocultural context
20-50 minutes	Self-reflection Small and large group discussions	Open discussions on experiences of IP
50 –55 minutes	Impact of IP on students	Understand the impact of IP, particularly in health science students
55-60 minutes	Addressing IP: Review of strategies in the literature Peer-level and institutional level strategies	Understand individual-level strategies to address IP
60-90 minutes	Self-reflection Small & large group discussions	Develop own strategies to combat IP Recognise IP at institutional level
90-95 minutes	Conclusion	

Results

Phase 1

A total of 115 participants completed the survey. The majority of participants identified as female (72.2%) and domestic students (67.8%) (Table 2). The female gender representation is comparable to the trends of the country's allied health workforce (Australian Institute of Health and Welfare, 2024). The proportion of international students (16.5%) closely aligns with the national higher education statistics that reports approximately 16% of students in health courses are from overseas (Department of Education, 2023). Missing data rates varied across variables from 13.9% to 23.5%.

Table 2

Participant Demographic Data and Mean CIPS scores (n= 115)

Variable		Participants (n)	Mean CIPS score
Gender	Woman or female	83 (72.2%)	72.6
	Man or male	11 (9.6%)	53.0
	Non-binary	2 (1.7%)	86.0
	I use a different term	1 (0.9%)	85.0
	Not reported	18 (15.7%)	
Age	21-22	25 (21.7%)	73.7
	23-24	42 (36.5%)	69.1
	25-30	25 (21.7%)	71.2
	31 or older	5 (4.3%)	76.0
	Not reported	18 (15.7%)	
Student status	Domestic student	78 (67.8%)	71.1
	International student	19 (16.5%)	71.6
	Not reported	18 (15.7%)	
Study year	First year	50 (43.5%)	72.2
	Final year	48 (41.7%)	70.1
	Not reported	17 (14.8%)	
Student WAM	50-64%	4 (3.5%)	77.5
	70-74%	20 (17.4%)	69.9
	75-79%	22 (19.1%)	70.7
	80-100%	42 (36.5%)	71.2
	Not reported	27 (23.5%)	
Audiology student	Audiology student	66 (57.4%)	70.6
	Other health science student	33 (28.7%)	72.0
	Not reported	16 (13.9%)	

Pre-workshop CIPS scores

All but two students reported moderate or higher levels of IP, with an overall mean CIPS score of 71.5 (SD=15.7) (Table 3). The largest group (42.6%) reported frequent IP symptoms and 34.8% of students experienced intense IP symptoms.

Table 3

Distribution of CIPS Scores

CIPS scores	Number of respondents (N=115)	Percentage
Few impostor characteristics (40 or less)	2	1.7%
Moderate IP (41 to 60)	24	20.9%
Frequent IP symptoms (61 to 80)	49	42.6%
Intense IP (Higher than 80)	40	34.8%

IP and self-efficacy

Bivariate correlations revealed a weak negative correlation between CIPS scores and each of the four domains of ESSE: communication ($r = -0.254$, $p = 0.012$), analytical inquiry ($r = -0.324$, $p = 0.001$), collaboration ($r = -0.313$, $p = 0.002$) and professional development ($r = -0.280$, $p = 0.005$). In other words, students with higher levels of IP tended to report poorer self-perceived efficacy in these four employable skills.

IP and demographic information

Female-identifying students had significantly higher levels of IP compared to male-identifying students ($t(13) = -4.65$, $p < 0.001$). Non-binary students reported the highest mean IP score (86), suggesting intense IP. However, as only two students identified as non-binary, it was not possible to conduct meaningful statistical analyses between IP and gender for this group of participants beyond descriptive statistics.

No significant differences were observed in the levels of IP between domestic and international students ($t(29) = -0.13$, $p = 0.899$), age groups ($F(3, 93) = 0.59$, $p = 0.625$), study year ($t(95) = -0.65$, $p = 0.516$) and student WAM ($F(3, 84) = 0.25$, $p = 0.859$).

Phase 2

A total of 32 Audiology students completed both the pre- and post-workshop surveys.

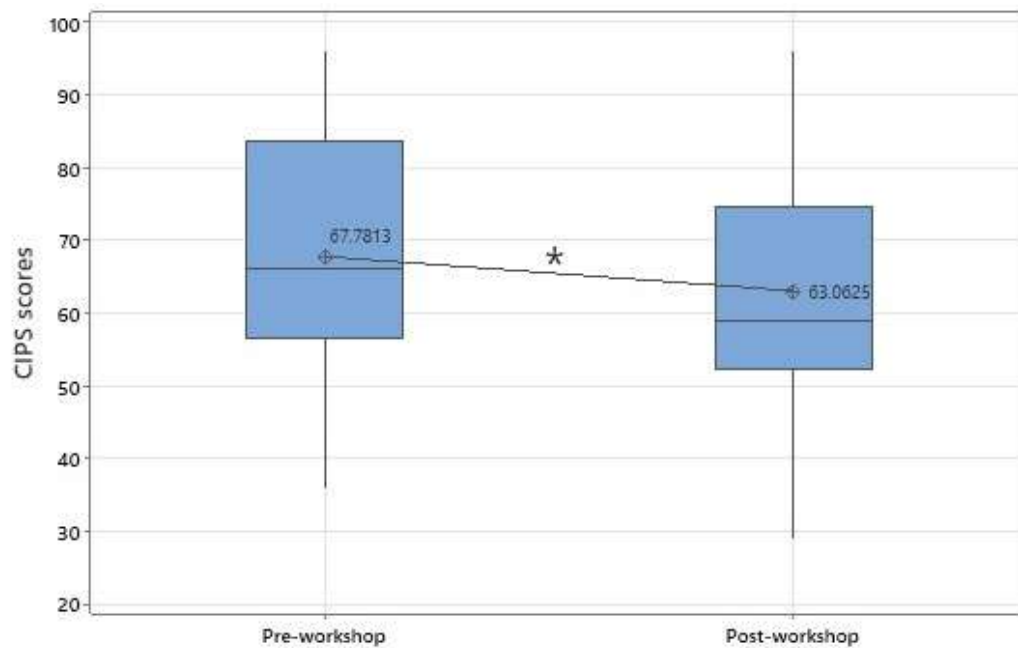
Post-workshop CIPS scores

The mean CIPS score on the post-workshop survey was 63. A dependent samples t-test between pre- (67.8 ± 15.8) and post-workshop CIPS scores (63.0 ± 16.2) indicated a statistically significant reduction in IP scores following workshop participation ($t(31) = 3.09$, $p = 0.004$) (Figure 1). Furthermore, the distribution of IP levels demonstrated a positive shift towards lower levels of IP

following the workshop intervention (Figure 2). Notably, the percentage of students experiencing intense IP symptoms decreased from 34.8% to 22.5%, and those with frequent IP symptoms dropped from 42.6% to 30%. After the workshop, most participants reported moderate IP symptoms, with 45% now falling into this category.

Figure 1

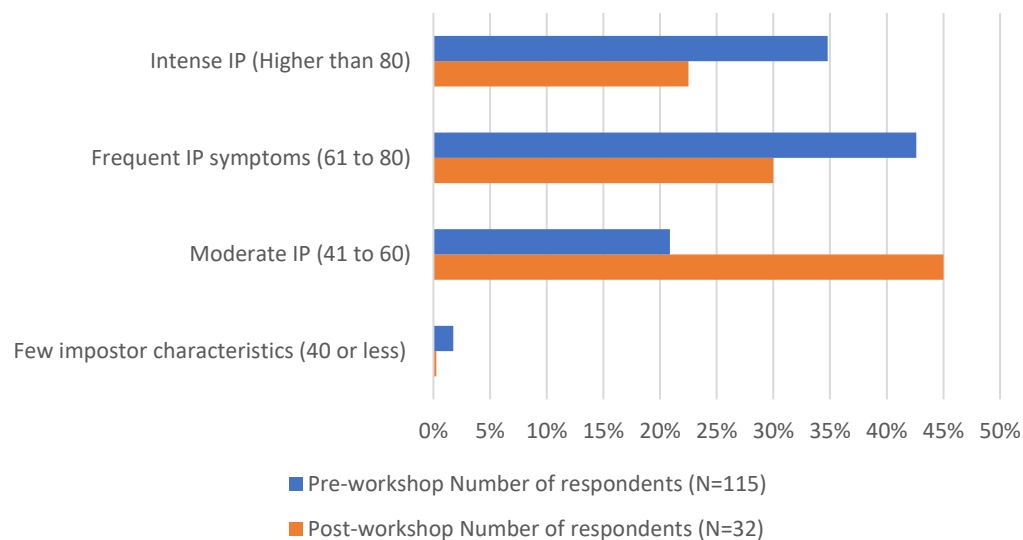
Pre- and Post-Workshop CIPS Scores (n=32)



Note. Data presented as means $\pm$ SD, an asterisk (*) indicates a significant difference between pre-workshop and post-workshop CIPS scores ($p = 0.004$).

Figure 2

Distribution of CIPS Scores Pre- and Post-Workshop



IP and self-efficacy

On dependent sample t-tests, all four domains showed an improvement in scores following workshop participation, with a statistically significant improvement observed in analytical inquiry skills domain ($t(31) = -2.29, p = 0.029$). No statistically significant difference was observed in communication ($t(31) = -1.90, p = 0.067$), collaboration ($t(31) = -0.59, p = 0.561$) and professional development ($t(31) = -1.79, p = 0.084$).

IP and demographic information

The general linear model between pre-workshop, post-workshop CIPS scores and demographic variables did not reveal significant interactions, suggesting that the CIPS scores following workshop participation did not differ significantly across demographic variables. However, a significant main effect of gender was found, ($F(2, 32) = 4.49, p = 0.019$). Tukey's pairwise comparisons revealed that female-identifying students ($M = 61.72, SE = 2.52, p = 0.021$) had significantly higher overall CIPS scores compared to male-identifying students ($M = 41.49, SE = 6.57$), regardless of the timepoint.

Discussion

This study reveals three key findings. First, high levels of IP were observed among graduate health science students, with significantly greater levels in female-identifying participants. Second, a negative correlation between IP and students' confidence in their job-related skills was noted, which is a novel finding. Third, the educational workshop developed and piloted among a cohort of Audiology students resulted in statistically significant reduction in IP scores immediately following workshop participation, indicating the potential effectiveness of this intervention at least in the short-term.

Prevalence of IP

The current study found 77% of graduate health science students experience significant IP (defined as students reporting frequent and intense IP). The prevalence findings are comparable to previous literature conducted with graduate health science students (70%) using the same validated measure of IP (CIPS) (Anderson et al., 2023). However, lower prevalence of significant IP has been reported among dental (60%) and medical students and residents (ranging between 23% to 47%) (Metz et al., 2020; Thomas & Bigatti, 2020). These rates are much lower than the current study and the one conducted by Anderson et al. (2023), and one explanation for this finding may be attributed to the gender distribution of participants. The current study's cohort predominantly consisted of female-identifying students, which is typical for health science programs in Australia. In contrast, medical and dental courses traditionally have a more balanced gender distribution, reflected in the studies investigating IP in this cohort (Legassie et al., 2008; Metz et al., 2020; Oriel et al., 2004). The higher prevalence of significant IP observed among health science students in the current study may be explained by the potential link between female-identifying individuals and elevated levels of IP, as consistently demonstrated in previous research (Price et al., 2024). The current study findings further corroborate this relationship, revealing that female-identifying students exhibited higher levels of IP compared to male-identifying students.

The gender difference findings strengthen the argument that the experience of IP depends on an individual's social and cultural environment (Clance & Lawry, 2024; Gullifor et al., 2023). Individuals who perceive themselves as atypical in their social environments may be vulnerable to IP (Harvey, 1981). Interestingly, international students in this study had comparable levels of IP to their domestic peers. Although higher levels of IP were reported among international graduates in older research (Legassie et al., 2008), the current study's findings align with broader literature reporting comparable levels of psychological distress between international and domestic students (King et al., 2023; Skromanis et al., 2018). Notably, research has identified higher levels of self-compassion in international students (Larcombe et al., 2023). Given that self-compassion is a recognised coping mechanism against IP, this may explain these somewhat unexpected results (Liu et al., 2023). In assessing other demographic variables, IP did not vary significantly based on students' academic performance (WAM), study year, or age group, which aligns with previous research (Bravata et al., 2020; Oriel et al., 2004). These findings reinforce the concept that IP is a pervasive phenomenon that individuals encounter regardless of academic success or life stage (Clance & Imes, 1978).

IP and Self-efficacy

The association between higher levels of IP and lower reported self-efficacy is one of the key findings of this study and aligns with existing literature (Pákozdy et al., 2023; Tao & Gloria, 2018). While previous research has used general self-efficacy scales, the present study employed a more targeted scale, the ESSE, which specifically assesses students' confidence in their employable skills (Ciarocco & Strohmetz, 2018). This was particularly relevant for entry-to-practice health science student participants, where employability plays a crucial role in their academic and professional development. Moreover, improvements in student self-efficacy skills were observed following workshop participation, but only analytical inquiry skills were statistically significant. Given that self-efficacy is a well-established predictor of academic achievement, addressing IP among university students could potentially enhance their confidence in vocational skills, improving both their academic performance and future career prospects (Bartimote-Aufflick et al., 2015).

Post-intervention Evaluation

To the authors' knowledge, the current study is the first to demonstrate a significant reduction in levels of IP following workshop participation among Audiology students. The percentage of students experiencing intense IP reduced from 34.8% to 22.5% as measured by the CIPS. While positive outcomes following workshop participation have been reported in healthcare-related literature, evaluating methods have been inconsistent, in the form of Likert-scale responses or free-response comments on self-developed questionnaires (Baumann et al., 2020; Haney et al., 2018; Rivera et al., 2021). This study builds on previous research by conducting the workshops with the same validated measure (CIPS) for pre- and post- intervention evaluations. The workshop-based intervention was designed to raise awareness and to initiate open conversations on IP in a formal university setting. It provided students with opportunities for self-reflection and for sharing their IP experiences with peers. Clance and Imes (1978) suggested that when one person shares their experiences, others realise they are not alone, which helps to normalise the phenomenon. An honest introduction to IP, self-reflection activities, and peer group discussions formed the core elements of the workshop. In this workshop, case studies were used to introduce

IP and facilitate discussions. The case studies were specific to health science settings; however, the core elements of the workshop can be adapted to wider educational contexts, potentially providing a foundation for addressing this pervasive issue.

Limitations & Future directions

This cross-sectional study identified high levels of IP among graduate health science students and demonstrated the success of an educational workshop among Audiology students. It should be acknowledged that despite anonymity, post-workshop evaluations may have been influenced by social desirability bias, with inflated responses driven by desires to please the facilitator. Moreover, self-selection bias could have occurred, as those experiencing IP were more likely to attend, and those perceiving benefit were more likely to respond, potentially overestimating the workshop's impact. Another limitation is that our data was collected from one of Australia's highest-ranked universities and the workshop evaluation in Phase 2 was limited to Audiology students, so the findings may not be generalisable to other educational institutions or disciplines. Additionally, the small sample size of international students (16.5%) and male-identifying students (9.6%) limits our ability to draw robust conclusions about the influence of these demographics on IP. Replicating such educational workshops with more balanced gender representation, diverse populations across health science disciplines, and other universities would be valuable.

Given the cross-sectional design, the study cannot assess the long-term benefits of the workshop or any causal associations between IP and self-efficacy skills. Longitudinal research is required to track the sustained impact of the workshops and determine whether changes in IP experiences occur as students transition into health science professionals. This would also help clarify any causal connections between IP and self-efficacy. Qualitative research methods could be employed to gain a deeper understanding of students' IP experiences, as well as specific coping mechanisms that are most beneficial to them. Overall, while this study demonstrates the workshop's success, future research should address these limitations to strengthen our understanding of IP and effective interventions.

Conclusion

The high levels of IP among graduate health science students underscores the critical need to address this issue during their academic journey. The present study highlights that students experiencing high levels of IP tend to have lower confidence in their employability skills. By addressing students' experience of IP, universities can potentially foster greater self-efficacy in these crucial abilities, supporting both psychological wellbeing and workforce readiness. The results of our pilot workshops demonstrate a potential approach to manage this pervasive issue across various educational fields.

Acknowledgements

The authors would like to thank Dr. Pauline Rose Clance for the use of her Clance Impostor Phenomenon Scale (CIPS) in this study.

The authors have no conflict of interest to disclose, and the study was not supported by any specific grant funding. Artificial Intelligence has not been used in the production of this article as per Crawford et al. (2023). The authors confirm that they have met the ethical standards expected as per Purvis & Crawford (2024).

The authors list the following CRediT contributions: All authors contributed to the study's conceptualisation, methodology and investigation. IH: Formal analysis and writing (original draft, review and editing); KG, GN, PB, DT: Writing – review & editing.

References

- Anderson, S., Decker, A., Garlock, T., Hammonds, C., Morris, H., & Sowers, B. (2023). Prevalence and predictive factors of impostor phenomenon among graduate students in healthcare-related programs. *Health Professions Education*, 9(3). <https://doi.org/10.55890/2452-3011.1047>
- Australian Institute of Health and Welfare. (2024). *Health workforce*. <https://www.aihw.gov.au/reports/workforce/health-workforce>
- Bandura, A. (1977). Self-efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Bartimote-Aufflick, K., Bridgeman, A., Walker, R., Sharma, M., & Smith, L. (2015). The study, evaluation, and improvement of university student self-efficacy. *Studies in Higher Education*, 41(11), 1918-1942. <https://doi.org/10.1080/03075079.2014.999319>
- Batur, A., Arslan, V., & Turan, S. (2024). Analysis of the relationship between medical achievement self-efficacy perception and impostor phenomenon in the postgraduate education process: a cross-sectional study. *BMC Medical Education*, 24(1), 1536. <https://doi.org/10.1186/s12909-024-06591-9>
- Baumann, N., Faulk, C., Vanderlan, J., Chen, J., & Bhayani, R. K. (2020). Small-Group Discussion Sessions on Imposter Syndrome. *MedEdPORTAL*, 16, 11004. https://doi.org/10.15766/mep_2374-8265.11004
- Bravata, D. M., Watts, S. A., Keefer, A. L., Madhusudhan, D. K., Taylor, K. T., Clark, D. M., Nelson, R. S., Cokley, K. O., & Hagg, H. K. (2020). Prevalence, Predictors, and Treatment of Impostor Syndrome: a Systematic Review. *Journal of General Internal Medicine*, 35(4), 1252-1275. <https://doi.org/10.1007/s11606-019-05364-1>
- Brown, T., Williams, B., & Lynch, M. (2011). The Australian DREEM: evaluating student perceptions of academic learning environments within eight health science courses. *International Journal of Medical Education*, 2, 94-101. <https://doi.org/10.5116/ijme.4e66.1b37>
- Browne, V., Munro, J., & Cass, J. (2017). Under the Radar: The Mental Health of Australian University Students. *JANZSSA - Journal of the Australian and New Zealand Student Services Association*, 25(2). <https://doi.org/10.30688/janzssa.2017.16>
- Chakraverty, D. (2020). The Impostor Phenomenon Among Black Doctoral and Postdoctoral Scholars in STEM. *International Journal of Doctoral Studies*, 15, 433-460. <https://doi.org/10.28945/4613>
- Ciarocco, N. J., & Strohmetz, D. B. (2018). The Employable Skills Self-Efficacy Survey: An assessment of skill confidence for psychology undergraduates. *Scholarship of Teaching and Learning in Psychology*, 4(1), 1-15. <https://doi.org/10.1037/stl0000102>
- Clance, P., & Lawry, S. (2024). Impostor phenomenon: Origins and treatment. In *The impostor phenomenon: Psychological research, theory, and interventions*. (pp. 17-43). <https://doi.org/10.1037/0000397-002>
- Clance, P. R. (1985). *Clance Impostor Phenomenon Scale (CIPS)* [Database record]. APA PsycTests. <https://doi.org/10.1037%2Ft11274-000>
- Clance, P. R., & Imes, S. (1978). The Imposter Phenomenon in High Achieving Women: Dynamics and Therapeutic Intervention. *Psychotherapy: Theory, Research & Practice*, 15(3), 241–247. <https://doi.org/10.1037/h0086006>

- Cokley, K., Awad, G., Smith, L., Jackson, S., Awosogba, O., Hurst, A., Stone, S., Blondeau, L., & Roberts, D. (2015). The Roles of Gender Stigma Consciousness, Impostor Phenomenon and Academic Self-Concept in the Academic Outcomes of Women and Men. *Sex Roles*, 73(9-10), 414-426. <https://doi.org/10.1007/s11199-015-0516-7>
- Cokley, K., McClain, S., Enciso, A., & Martinez, M. (2013). An Examination of the Impact of Minority Status Stress and Impostor Feelings on the Mental Health of Diverse Ethnic Minority College Students. *Journal of Multicultural Counseling and Development*, 41(2), 82-95. <https://doi.org/10.1002/j.2161-1912.2013.00029.x>
- Cokley, K., Smith, L., Bernard, D., Hurst, A., Jackson, S., Stone, S., Awosogba, O., Saucer, C., Bailey, M., & Roberts, D. (2017). Impostor feelings as a moderator and mediator of the relationship between perceived discrimination and mental health among racial/ethnic minority college students. *Journal of Counseling Psychology*, 64(2), 141-154. <https://doi.org/10.1037/cou0000198>
- Crawford, J., Cowling, M., Ashton-Hay, S., Kelder, J.-A., Middleton, R., & Wilson, G. (2023). Artificial Intelligence and Authorship Editor Policy: ChatGPT, Bard Bing AI, and beyond. *Journal of University Teaching and Learning Practice*, 20(5). <https://doi.org/10.53761/1.20.5.01>
- Deasy, C., Coughlan, B., Pironom, J., Jourdan, D., & Mannix-McNamara, P. (2016). Psychological distress and help seeking amongst higher education students: findings from a mixed method study of undergraduate nursing/midwifery and teacher education students in Ireland. *Irish Educational Studies*, 35(2), 175-194. <https://doi.org/10.1080/03323315.2016.1146157>
- Department of Education. (2023). *Higher Education Statistics - 2023 Student data*. <https://www.education.gov.au/higher-education-statistics/student-data/selected-higher-education-statistics-2023-student-data/key-findings-2023-student-data>
- Forbes-Mewett, H., & Sawyer, A.-M. (2011). *Mental Health Issues amongst International Students in Australia: Perspectives from Professionals at the Coal-face*. The Australian Sociological Association Conference Local Lives/Global Networks, University of Newcastle, New South Wales. November 29 – December 2. <https://www.campusreview.com.au/wp-content/uploads/2011/11/Mental-Health-Issues-among-International-Students-in-Australia.pdf>
- Garba, R., Coleman, C., & Kelley, T. (2024). The impostor phenomenon and mental health. In K. Cokley (Ed.), *The impostor phenomenon: Psychological research, theory, and interventions*. (pp. 61-79). <https://doi.org/10.1037/0000397-004>
- Gullifor, D. P., Gardner, W. L., Karam, E. P., Noghani, F., & Coglisier, C. C. (2023). The impostor phenomenon at work: A systematic evidence-based review, conceptual development, and agenda for future research. *Journal of Organizational Behavior*, 45(2), 234-251. <https://doi.org/10.1002/job.2733>
- Haney, T. S., Birkholz, L., & Rutledge, C. (2018). A Workshop for Addressing the Impact of the Imposter Syndrome on Clinical Nurse Specialists. *Clinical Nurse Specialist*, 32(4), 189-194. <https://doi.org/10.1097/NUR.0000000000000386>
- Harvey, J. C. (1981). *The Impostor Phenomenon and Achievement: A Failure to Internalize Success*. [Doctoral dissertation, Temple University].

- Henning, K., Ey, S., & Shaw, D. (1998). Perfectionism, the imposter phenomenon and psychological adjustment in medical, dental, nursing and pharmacy students. *Medical Education*, 32(5), 456-464. <https://doi.org/10.1046/j.1365-2923.1998.00234.x>
- Holliday, A. M., Gheihman, G., Cooper, C., Sullivan, A., Ohyama, H., Leaf, D. E., & Leaf, R. K. (2020). High Prevalence of Imposterism Among Female Harvard Medical and Dental Students. *Journal of General Internal Medicine*, 35(8), 2499-2501. <https://doi.org/10.1007/s11606-019-05441-5>
- Ikbaal, M. Y., Salim Musa, N., & Aqilah. (2018). Prevalence of Impostor Phenomenon among Medical Students in a Malaysian Private Medical School. *International Journal of Medical Students*, 6(2), 66-70. <https://doi.org/10.5195/ijms.2018.10>
- Jöstl, G., Bergsmann, E., Lüftenegger, M., Schober, B., & Spiel, C. (2012). When Will They Blow My Cover? *Zeitschrift für Psychologie*, 220(2), 109-120. <https://doi.org/10.1027/2151-2604/a000102>
- King, N., Rivera, D., Cunningham, S., Pickett, W., Harkness, K., McNevin, S. H., Milanovic, M., Byun, J., Khanna, A., Atkinson, J., Saunders, K. E. A., & Duffy, A. (2023). Mental health and academic outcomes over the first year at university in international compared to domestic Canadian students. *Journal of American College Health*, 71(9), 2663-2672. <https://doi.org/10.1080/07448481.2021.1982950>
- Larcombe, W., Ryan, T., & Baik, C. (2023). Are international students relatively resilient? Comparing international and domestic students' levels of self-compassion, mental health and wellbeing. *Higher Education Research & Development*, 43(2), 362-376. <https://doi.org/10.1080/07294360.2023.2234315>
- Leahy, C., Peterson, R., Wilson, I., Newbury, J., Tonkin, A., & Turnbull, D. (2010). Distress levels and self-reported treatment rates for medicine, law, psychology and mechanical engineering tertiary students: cross-sectional study. *The Australian and New Zealand Journal of Psychiatry*, 44(7), 608–615. <https://doi.org/10.3109/00048671003649052>
- Legassie, J., Zibrowski, E. M., & Goldszmidt, M. A. (2008). Measuring resident well-being: impostorism and burnout syndrome in residency. *Journal of General Internal Medicine*, 23(7), 1090-1094. <https://doi.org/10.1007/s11606-008-0536-x>
- Liu, S., Wei, M., & Russell, D. (2023). Effects of a brief self-compassion intervention for college students with impostor phenomenon. *Journal Counseling Psychology*, 70(6), 711-724. <https://doi.org/10.1037/cou0000703>
- Logan, B., & Burns, S. (2023). Stressors among young Australian university students: A qualitative study. *Journal of American College Health*, 71(6), 1753-1760. <https://doi.org/10.1080/07448481.2021.1947303>
- Mak, K. K. L., Kleitman, S., & Abbott, M. J. (2019). Impostor Phenomenon Measurement Scales: A Systematic Review. *Frontiers in Psychology*, 10, 671. <https://doi.org/10.3389/fpsyg.2019.00671>
- McAllister, L., & Nagarajan, S. V. (2015). Accreditation requirements in allied health education: Strengths, weaknesses and missed opportunities. *Journal of Teaching and Learning for Graduate Employability*, 6(1), 2—24. <https://doi.org/10.21153/jtlge2015vol6no1art570>
- Metz, C. J., Ballard, E., & Metz, M. J. (2020). The stress of success: An online module to help first-year dental students cope with the Impostor Phenomenon. *Journal of Dental Education*, 84(9), 1016-1024. <https://doi.org/10.1002/jdd.12181>

- Ofstedal, S., Fenton, S., Hansen, V., Whatnall, M. C., Ashton, L. M., Haslam, R. L., Hutchesson, M. J., & Duncan, M. J. (2024). Changes in physical activity, diet, sleep, and mental well-being when starting university: A qualitative exploration of Australian student experiences. *Journal of American College Health*, 72(9), 3715-3724. <https://doi.org/10.1080/07448481.2023.2194426>
- Oriel, K., Plane, M., & Mundt, M. (2004). Family Medicine Residents and the Impostor Phenomenon. *Family Medicine*, 36(4), 248–252.
- Pákozdy, C., Askew, J., Dyer, J., Gately, P., Martin, L., Mavor, K., & Brown, G. (2023). The imposter phenomenon and its relationship with self-efficacy, perfectionism and happiness in university students. *Current Psychology*, 43(6), 5153-5162. <https://doi.org/10.1007/s12144-023-04672-4>
- Para, E., Dubreuil, P., Miquelon, P., & Martin-Krumm, C. (2024). Interventions addressing the impostor phenomenon: a scoping review. *Frontiers in Psychology*, 15, 1360540. <https://doi.org/10.3389/fpsyg.2024.1360540>
- Price, P. C., Holcomb, B., & Payne, M. B. (2024). Gender differences in impostor phenomenon: A meta-analytic review. *Current Research in Behavioral Sciences*, 7. <https://doi.org/10.1016/j.crbeha.2024.100155>
- Purvis, A. J., & Crawford, J. (2024). Ethical Standards in Social Science Publications. *Journal of University Teaching and Learning Practice*, 21(09). <https://doi.org/10.53761/hqnqr710>
- Rivera, N., Feldman, E. A., Augustin, D. A., Caceres, W., Gans, H. A., & Blankenburg, R. (2021). Do I Belong Here? Confronting Imposter Syndrome at an Individual, Peer, and Institutional Level in Health Professionals. *MedEdPORTAL*, 17, 11166. https://doi.org/10.15766/mep_2374-8265.11166
- Siddiqui, Z. K., Church, H. R., Jayasuriya, R., Boddice, T., & Tomlinson, J. (2024). Educational interventions for imposter phenomenon in healthcare: a scoping review. *BMC Medical Education*, 24(1), 43. <https://doi.org/10.1186/s12909-023-04984-w>
- Skromanis, S., Cooling, N., Rodgers, B., Purton, T., Fan, F., Bridgman, H., Harris, K., Presser, J., & Mond, J. (2018). Health and Well-Being of International University Students, and Comparison with Domestic Students, in Tasmania, Australia. *International Journal of Environmental Research and Public Health*, 15(6). <https://doi.org/10.3390/ijerph15061147>
- Stallman, H. M. (2010). Psychological distress in university students: A comparison with general population data. *Australian Psychologist*, 45(4), 249-257. <https://doi.org/10.1080/00050067.2010.482109>
- Tao, K. W., & Gloria, A. M. (2018). Should I Stay or Should I Go? The Role of Impostorism in STEM Persistence. *Psychology of Women Quarterly*, 43(2), 151-164. <https://doi.org/10.1177/0361684318802333>
- Thomas, M., & Bigatti, S. (2020). Perfectionism, impostor phenomenon, and mental health in medicine: a literature review. *International Journal of Medical Education*, 11, 201-213. <https://doi.org/10.5116/ijme.5f54.c8f8>
- Villwock, J. A., Sobin, L. B., Koester, L. A., & Harris, T. M. (2016). Impostor syndrome and burnout among American medical students: a pilot study. *International Journal of Medical Education*, 7, 364-369. <https://doi.org/10.5116/ijme.5801.eac4>