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RESEARCH ARTICLE

A feasibility study on the effect of an asynchronous online workshop on perceived research publication needs among pharmacy students in Nigeria

Adaobi Uchenna Mosanya[1], Ifunanya Ikhile[2], Chukwuemeka Michael Ubaka[1], Maxwell Ogochukwu Adibe[1]

[1] Department of Clinical Pharmacy and Pharmacy Management, Faculty of Pharmaceutical Sciences, University of Nigeria, Nsukka, Nigeria
[2] Medical Education Centre, B114 Medical School, University of Nottingham, United Kingdom

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Correspondence
Adaobi Uchenna Mosanya
Department of Clinical Pharmacy and Pharmacy Management
Faculty of Pharmaceutical Sciences
University of Nigeria
Nsukka
Nigeria
adaobi.mosanya@unn.edu.ng

Abstract

Background: Few undergraduate students publish their research due to low self-efficacy in academic writing. This study examined an asynchronous online workshop aimed at enhancing final-year pharmacy students' academic writing self-efficacy, reducing writing apprehension, and addressing perceived publication needs, while also exploring the correlation among these variables. **Methods:** A month-long asynchronous online workshop on research writing and publication was conducted for final-year pharmacy students from 12 schools across Nigeria, selected based on their completion of a final-year research project, consent, and WhatsApp access. Held in October 2024, the intervention included ten modules with recorded content and Q&A support. Pre- and post-workshop data were collected via a validated online questionnaire measuring socio-academic backgrounds, writing apprehension, academic writing self-efficacy, and publication needs. Instrument reliability was high (Cronbach's alpha: Writing Apprehension Test = 0.89, Self-efficacy = 0.88, Publication Needs = 0.94). **Results:** Out of the 77 registrants, 25 completed the programme and subsequent assessment. Academic self-efficacy and writing apprehension scores showed no significant changes post-workshop. However, publication needs assessment scores decreased significantly from pre-workshop (M=80.9, SD=15.4) to post-workshop (M=60.1, SD=20.7), $t(24) = 4.902$, Cohen's $d = 0.98$ & $p < 0.001$ indicating a substantial reduction. **Conclusion:** The asynchronous online workshop effectively reduced students' perceived publication needs, highlighting its potential in addressing publication barriers for pharmacy students in Nigeria. Future interventions should explicitly integrate strategies to address writing self-efficacy and apprehension.

Introduction

Effectively disseminating research findings through peer-reviewed journals is critical for advancing knowledge and practice within academia (Bray & Braxton, 2022). Journal article publications serve as the primary means of sharing research outcomes (Yan & Zhiping, 2023; Mwangi *et al.*, 2024). However, undergraduate students frequently encounter difficulties in publishing their research, which often stems from low self-efficacy and anxiety surrounding academic writing (Thompson & Cobb, 2023). Students with insufficient confidence in their writing abilities are less likely to submit their work for publication. These challenges are particularly pronounced in many developing countries, including Nigeria (Igiri *et al.*, 2021).

Academic institutions and educators must emphasise research socialisation—the process of engaging students in scholarly communication, academic discourse, and publication practices— as an integral

part of their research training. The quality of writing is a decisive factor in the likelihood of a research project being published (Cossio-Alva *et al*., 2023). Beyond technical writing skills, academic writing self-efficacy is equally crucial (Mitchell *et al*., 2021; Mitchell *et al*., 2023). Self-efficacy, as defined by Bandura, pertains to an individual's belief in their ability to successfully and confidently carry out a task (Bandura, 1977; Collins *et al*., 2024). Improving attitudes towards research dissemination can help students overcome this apprehension. Low self-efficacy in academic writing among students has been linked to depleted social or academic capital and reduced interest in opportunities to enhance writing skills through frequent participation in academic writing projects (Berdanier & Zerbe, 2018).

Despite the growing emphasis on research in undergraduate, student publication rates remain notably low (Al-Busaidi *et al*., 2019; Aluh & Adibe, 2021; Alsulami *et al*., 2023). The available literature on undergraduate research publications is sparse; therefore, some studies on postgraduate publications will be cited here. There are a few publications by postgraduate students, with the majority having limited publication experience (Tella & Onyancha, 2021). Furthermore, research and teaching staff in Nigerian institutions frequently report obstacles, including a lack of funding, insufficient professional mentorship, inadequate research facilities, and a lack of prior writing experience (Okoduwa *et al*., 2018). Outdated or non-existent policies and a poor educational system also cripple research and innovation in Nigerian tertiary education (Aguboshim *et al*., 2021).

Addressing these barriers requires a comprehensive approach that includes mentorship, skills development (Zhang *et al*., 2025). Mentors can contribute to self-efficacy through mastery experiences, vicarious experiences, and verbal persuasion, fostering confidence in navigating the writing and publication process (Buckley *et al*., 2021). Efforts to improve this in Nigeria include writing workshops designed to improve pharmacy students' academic writing self-efficacy, reduce writing apprehension and enhance research publication self-efficacy.

Extracurricular activities such as academic writing and publication workshops can complement the mentorship provided by supervisors. These workshops, led by mentors or other faculty members, can address common challenges students face and offer practical strategies to overcome writing apprehension and improve publication outcomes.

This study explored the feasibility of an asynchronous online workshop designed to improve final-year Nigerian pharmacy students' academic writing self-efficacy, reduce writing apprehension, and perceived research publication needs, with a secondary objective to determine the correlation among the three variables.

Methods

Study design

This study employed a pre-post design for an asynchronous, month-long workshop focused on research writing and publication. The intervention mirrored a prior model for teaching science communication (Gumusoglu *et al*., 2022). The participants were final-year pharmacy students invited from the first two pharmacy schools established in each of the six geopolitical zones, ensuring good representation across Nigeria.

Study setting

The workshop was delivered asynchronously via a dedicated WhatsApp group. This virtual mode was adopted to enhance accessibility and flexibility for participants located across diverse geopolitical areas in Nigeria. The asynchronous nature allowed students to engage with the workshop content at their own pace, accommodating varying schedules and potential limitations such as inconsistent electricity and unreliable internet connectivity, which are prevalent challenges in the region.

Study procedure

The online research writing and publication workshop was developed and facilitated by experienced pharmacy lecturers with extensive publishing backgrounds. The intervention comprised ten distinct modules delivered over one month, from October 1st to October 31st, 2024. Recorded modules were made available online, and links were shared according to the programme schedule (Appendix A). Participants were actively encouraged to engage with the material and complete tasks promptly. The modules covered a comprehensive curriculum designed to improve academic writing and publication skills, including literature search strategies, publishing ethics, appropriate journal identification, writing the methods, results, and discussion sections, etc. (Appendix A). Beyond the recorded modules and tasks, participants received support through dedicated Question and Answer sessions regarding the publication process.

Ethics

The study was conducted in accordance with the principles of the World Medical Association Declaration of Helsinki. Ethical approval was received from the Ethics Research Committee of the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu State, Nigeria, in May 2024. (Approval number is NHREC/05/01/200BB-FW00002458-1RB00002323/UNTH/NHREC/2024/05/1049).
Additionally, each study participant was duly informed about the research, and written and signed consent was obtained from them before the commencement of the study. Measures were taken to safeguard respondents' privacy rights. Their data were handled with utmost confidentiality during and after the data collection. They were also aware of the freedom to withdraw from the study if they so wished, without incurring any negative consequences.

Participants

Final-year pharmacy students from 12 pharmacy schools in Nigeria were invited to participate in the workshop. Two pharmacy schools from each of the six geopolitical zones were invited to participate in the study to ensure adequate representation. From the South-West zone, Obafemi Awolowo University (1962) and University of Ibadan (1980); South-East zone, University of Nigeria, Nsukka (1970) and Nnamdi Azikiwe University (2007); South- South, University of Benin (1970) and University of Uyo (1990); North Central, University of Jos (1982) and University of Ilorin (2013); North East, University of Maiduguri (2002) and Gombe State University (2010); North West, Ahmadu Bello University (1968) and Usmanu Danfodiyo University (2007). The mode of invitation was an electronic flyer sent to the respective class WhatsApp platform. The link to the online registration was included on the flyer. The recruitment lasted for one month between August and September 2024. Eligibility criteria included completing a final-year research project, consent to participate, and access to WhatsApp.

Sample size

The calculated sample size was a minimum of 58 students, assuming a significant level of 0.05 (two-tailed), statistical power of 80% and effect size of 0.52 using the following formula:

$2 \times [(Z\alpha /2 + Z\beta)/d]2$ to ensure statistical reliability. Out of the 77 initial registrants, 32 students met the eligibility criteria and commenced participation, with 25 completing the programme and contributing to the post-intervention assessment.

Data collection and instruments

Baseline data were collected using a validated online questionnaire that assessed participants' socio-academic backgrounds. The primary outcome measures were evaluated using a modified 10-item Writing Apprehension Test and a 7-item academic writing self-efficacy scale. Both scales utilised a five-point Likert format for responses, ranging from "*strongly disagree*" to "*strongly agree*". Additionally, participants rated their perceived manuscript writing and publication needs on a 0 – 10 scale, where 0 indicated no need for improvement and 10 represented the highest perceived need. Post-workshop data were collected using these same instruments to ensure consistency and comparability.

The writing apprehension test used in this study was a modified 10-item version. The foundational instrument for measuring writing apprehension, known as the Writing Apprehension Scale, was empirically developed by Daly and Miller in 1975 (Daly & Miller, 1975; Kostić Bobanović, 2016). This scale has been widely and frequently adapted or re-examined in subsequent research to suit various study contexts and populations (Autman & Kelly, 2017; Limpo, 2018).

The academic writing self-efficacy scale employed was a 7-item modified version. Common and validated instruments for assessing academic writing self-efficacy include the Situated Academic Writing Self-efficacy Scale (Mitchell *et al*., 2021) and Self-Efficacy for Writing Scale developed initially by Bruning *et al* (Ramos-Villagrasa *et al*., 2017). Such scales are often adapted to align with the specific educational and cultural contexts of the study population, ensuring relevance and validity (Meza & González, 2020)

The research publication needs assessment questionnaire was developed following the different components involved in research writing and publication. It is meant to assess the level of need for support (i.e. mentorship or training) that the participants need in the different aspects of research writing and publication. It contained 10 items asking the respondents to rate their need for support, starting from zero (which signifies no need) to ten (which denotes the highest need). The reliability test, Cronbach alpha for the writing apprehension test, the writing self-efficacy and the publication needs assessment were 0.89, 0.88 and 0.94 respectively.

Statistical analysis

The collected responses were organised and cleaned in Microsoft Excel before being transferred to IBM SPSS version 27 for data analysis. Participants' responses on

academic writing self-efficacy, writing apprehension, and research publication needs were treated as continuous variables. Total scores of each scale for all the participants were computed to ensure comprehensive data analysis. Descriptive statistics, including percentages and measures of central tendency, were computed. To evaluate differences between pre- and post-workshop scores for writing apprehension, academic writing self-efficacy, and publication needs assessment, a paired sample two-tailed t-test was conducted. Statistical significance was set at $p < 0.05$, and Cohen's d was calculated to determine effect size. The data analysis for this study adopted a per-protocol method, focusing exclusively on the 25 participants who completed the entire workshop and provided both pre-post intervention data. The rationale for using per-protocol analysis was to evaluate the effectiveness of receiving full intervention as planned. This approach allows for a clearer understanding of the workshop's impact on those who were fully exposed to its content and activities, thereby providing a more direct assessment of the intervention's efficacy under ideal adherence conditions. While this method may overestimate the intervention effect in real-world settings where adherence might vary, it is valuable for understanding the potential benefits for individuals who fully engage with the programme.

Results

A total of 25 students completed the workshop and were included in the per-protocol analysis for the post-intervention assessment. This number is substantially below the minimum sample size calculated for this study (58). Therefore, this indicates an attrition rate of 58.4% from initial registrants (77) to eligible participants (32), and a further 21.9% from the eligible participants to completers. While specific reasons for non-completion among the 7 participants were not explicitly collected as part of the study, it is plausible that challenges inherent to asynchronous online delivery in the Nigerian context, such as inconsistent electricity and unreliable internet connectivity, influenced participants' ability to fully engage and complete the workshop. Additionally, participants were informed of their freedom to withdraw from the study at any point without negative consequences. Figure 1 shows the flow diagram of the study participants' recruitment process. Participant characteristics indicated that approximately 60% were female, with an equal distribution of interest in community and academic pharmacy careers (Table I).

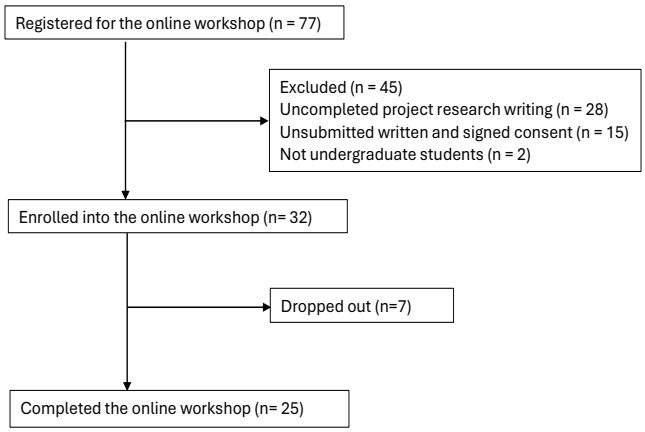

Figure 1: Flowchart of the study participants' recruitment process

Table I: Socio-academic characteristics of the participants

Variable	Number (%)
Gender	
Male	10 (40)
Female	15 (60)
Age (years)	
20-29	23 (92)
30-39	2 (8)
Previous degree/diploma before pharmacy education	
No	22 (88)
Yes	3 (12)
Previous involvement in research	
No	9 (36)
Yes	16 (64)
Preferred pharmacy practice	
Hospital	4 (16
Community	7 (28)
Industrial pharmacy	6 (24)
Administration	1 (4)
Academic pharmacy	7 (28)

Differences between pre-and post-workshop scores for academic writing self-efficacy, writing apprehension, and publication needs assessment were evaluated using a paired sample two-tailed *t*-test, with statistical significance set at $p < 0.05$. Cohen's d was calculated to determine the effect size for each outcome.

There was no statistically significant improvement in academic writing self-efficacy scores post-workshop (M = 27.80, SD 3.76) compared to pre-workshop (M = 26.56 (4.73). The paired sample *t*-test yielded

t(24) = -1.05 with a *p* value of 0.30. The calculated Cohen's d = -0.21 (Table II) indicates a small, practically negligible effect, suggesting that while there was a numerical increase, it was neither statistically significant nor practically meaningful.

Table II: Writing apprehension, writing self-efficacy, and publication needs assessment scores

Statement	Pre-workshop		Post-workshop	
	Mean (SD)	Min-Max	Mean (SD)	Min-Max
Writing apprehension test				
I avoid writing when I can.	2.3 (0.9)	1-4	3.9 (0.4)	3-5
My mind seems to go blank when I start to work on my manuscript.	2.8 (1.1)	1-5	3.6 (0.9)	1-5
Expressing ideas through writing my manuscript seems to be a waste of time.	1.8 (0.8)	1-4	2.5 (1.2)	1-5
I am nervous about writing my manuscript.	2.8 (1.1)	1-4	2.7 (1.1)	1-5
I never seem to be able to clearly write down my ideas.	2.6 (1.2)	1-5	1.8 (0.7)	1-4
I expect to do poorly in a manuscript writing and publication course even before I enrol in it.	2.1 (1.1)	1-4	2.7 (1.1)	1-4
I have a terrible time organising my ideas when I write.	2.6 (1.1)	1-4	2.3 (1.1)	1-4
When I hand in my manuscript, I know I am going to do poorly.	2.0 (0.9)	1-4	1.9 (0.8)	1-4
I do not think I write as well as most other people.	2.8 (1.2)	1-5	2.6 (1.0)	1-4
I am no good at writing.	2.1(0.9)	1-4	1.8 (0.9)	1-4
Total score (*p*-value = 0.61)	**24.1 (7.5)**	**12-39**	**23.36 (6.6)**	**15-36**
Academic writing self-efficacy				
If the writing gets hard, I can find ways to overcome my writing difficulties.	4.1 (0.7)	2-5	4.2 (0.7)	2-5
I can successfully use scholarly academic words and phrases when writing my research project	3.7 (0.8)	2-5	3.9 (0.8)	2-5
I can combine or synthesise multiple sources I have read to create an original product.	3.6 (0.9)	1-5	4.2 (0.7)	2-5
When I read articles about my topic, the connections I feel with the ideas of other authors can inspire me to express my own ideas in writing.	4.0 (0.8)	1-5	3.9 (0.8)	2-5
Even with very specific research work guidelines, I can find ways of writing my project to make it unique.	3.8 (1.0)	1-5	4.0 (0.7)	2-5
I feel I can develop my own writing voice (ways of speaking in my writing that are uniquely me).	3.7 (0.9)	1-5	4.1 (0.6)	3-5
I can comfortably express pharmaceutical concepts, language and values in writing my research project.	3.7 (0.9)	2-5	3.8 (0.9)	2-5
Total score (*p*-value = 0.34)	**26.6 (4.7)**	**12-33**	**28 (3.8)**	**15-35**
Manuscript writing and publication needs assessment				
Published literature search strategies.	7.9 (1.9)	3-10	5.8 (2.9)	0-10
Writing the background of a study.	8.1 (1.9)	4-10	6.2 (2.4)	1-10
Writing the literature review	7.9 (2.1)	2-10	6.2 (2.6)	1-10
Result presentation and interpretation.	8.1 (2.3)	1-10	6.2 (2.0)	1-10
Writing the discussion section.	8.0 (1.6)	5-10	6.3 (2.5)	1-10
Use of a referencing tool.	7.3 (2.0)	3-10	5.6 (3.3)	0-10
Research writing ethics and avoiding plagiarism.	8.0 (1.9)	4-10	5.6 (2.6)	0-10
Identification of a suitable journal for publication.	8.1 (2.0)	4-10	5.8 (2.4)	0-10
Identifying and avoiding predatory journals.	8.4 (1.9)	4-10	6.2 (2.2)	1-10
Manuscript submission process and peer review.	9.0 (1.7)	4-10	6.2 (2.8)	1-10
Total score (*p*-value < 0.001)	**80.88 (15.42)**	**45-100**	**60.1 (20.7)**	**9-95**

Writing apprehension scores also showed no significant change following the workshop. Pre-workshop scores averaged M = 24.12, SD = 7.48, while post-workshop scores: M = 23.36, SD = 6.65). The paired samples t-test result was t(24) = 0.52 with a p value of 0.61, Cohen's d = 0.103 (Figure 2).

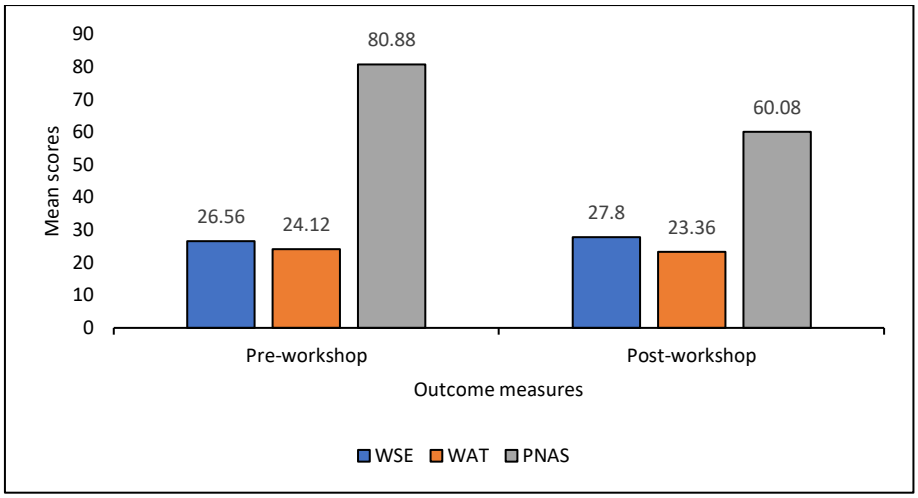

Figure 2: Paired sample t-test of total scores pre- & post-online workshop

In contrast, publication needs assessment scores demonstrated a statistically significant decrease from pre-workshop (M = 80.88, SD = 15.42) to post-workshop (M = 60.08, SD = 20.67). The paired samples t-test indicated a highly significant change with t(24) = 4.902 and $p < 0.001$.This significant statistical outcome is accompanied by a large effect size, Cohen's d = 0.98, indicating a substantial and practically meaningful reduction in perceived publication needs. This suggests that participants felt considerably more equipped and confident to navigate the publication process after completing the workshop

A significant negative correlation was found between writing apprehension and academic writing self-efficacy scores, both pre- and post-workshop (Table III). However, no significant correlation was observed between academic writing self-efficacy and publication self-efficacy, as measured by the needs assessment score.

Table III: Correlations of Writing Apprehension Test (WAT), Writing Self-efficacy (WSE) and manuscript writing & Publication Needs Assessment (PNAS) scores

Pre-workshop	WAT	WSE	PNAS
WAT			
Pearson's correlation	1	-0.662*	0.412*
Significant (2-tailed)		< 0.001	0.041
N		25	25
WSE			
Pearson's correlation		1	-0.324
Significant (2-tailed)			0.114
N			25
PNAS			
Pearson's correlation			1
Significant (2-tailed)			
N			
Post-workshop	**WAT**	**WSE**	**PNAS**
WAT			
Pearson's correlation	1	-0.622*	-0.086
Significant (2-tailed)		< 0.001	0.683
N		25	25
WSE			
Pearson's correlation		1	0.056
Significant (2-tailed)			0.792
N			25
PNAS			
Pearson's correlation			1
Significant (2-tailed)			
N			

Discussion

This study primarily aimed to explore the effects of an asynchronous online workshop on academic writing self-efficacy, writing apprehension, and perceived research publication needs among final-year pharmacy students in Nigeria. The findings showed a significant positive influence of the workshop on students' perceived publication needs, while showing no statistically significant changes in academic writing self-efficacy or writing apprehension.

The most salient outcome of this intervention was the statistically significant reduction in the students' perceived publication needs after participating in the asynchronous online workshop. This suggests that the programme effectively equipped participants with a clearer understanding and increased confidence in navigating the complex academic publication process. This positive shift is particularly encouraging given the broader goal of empowering researchers, especially in low- and middle-income countries, by providing practical strategies for research dissemination (Busse *et al*., 2022). The asynchronous format, despite its inherent challenges, appears to have successfully conveyed essential knowledge regarding the publication journey.

Conversely, the workshop did not result in a statistically significant increase in academic writing self-efficacy. While various educational interventions, including workshops and scaffolded writing programmes, have been shown to improve writing self-efficacy in other populations (Raviv, 2021; Rice, 2023; Shea, 2023; Allagui, 2024; McLellan *et al*., 2024; Jiang, 2025), the absence of a significant change here points to potential limitations in the workshop's design or delivery within this specific context. Developing self-efficacy, defined as an individual's belief in their capacity to execute tasks successfully, can be a deeply ingrained process that may require more intensive, personalised, or prolonged intervention than a month-long asynchronous programme could provide. Another plausible reason for the non-significant change was heavy focus on knowledge transmission rather than on developing the study's self-efficacy through mastery experiences, which is the most influential of the four sources of self-efficacy according to Bandura's social cognitive theory.

Writing apprehension scores did not demonstrate a statistically significant change post-workshop. The workshop modules primarily focused on the procedural aspects of research writing and publication, with less explicit emphasis on coping mechanisms for managing writing apprehension.

The observed negative correlation between writing apprehension and writing self-efficacy, along with a positive correlation between writing apprehension and perceived publication needs, aligns with existing literature, which generally posits that higher self-efficacy is associated with lower apprehension (Mitchell *et al*., 2017)

Studies in other developing regions, such as Libya, have reported high levels of writing apprehension among university students, attributed to factors including language proficiency, lack of confidence, and fear of evaluation (Abdullah *et al*., 2022). While virtual workshops offer a cost-effective solution for broad outreach, as evidenced from Pakistan (Ukrani *et al*., 2021), their effectiveness in LMICs can be constrained by infrastructural limitations such as inconsistent electricity and unreliable internet connectivity (Busse *et al*., 2022).

Limitations

This study is subject to several important limitations that require consideration. Firstly, the relatively small sample of 25 completing participants significantly restricts the generalisability of these findings. A larger, more diverse participant pool would enhance statistical power and allow for more robust and widely applicable conclusions.

Secondly, reliance on a single-group pre-post study design without a comparable control group precludes definitive causal inferences about the workshop's direct impact.

Furthermore, the asynchronous delivery of the workshop, while offering flexibility, encountered practical challenges in the Nigerian context, specifically inconsistent electricity and unreliable connectivity, which participants cited as hindrances to consistent engagement. This highlights that while online interventions hold promise, their design and implementation in LMICs must explicitly integrate strategies to mitigate local infrastructural limitations to optimise participation and learning outcomes (McCaul *et al*., 2021; Asghari *et al*., 2022; Kiguli-Malwadde *et al*., 2023).

Additionally, the data relied on self-reported measures, which are susceptible to social desirability bias and other response biases.

Finally, the workshop curriculum, while extensive, primarily focused on the mechanics and processes of publication rather than explicitly addressing psychological barriers such as writing apprehension and strategies to overcome them, potentially contributing to the non-significant change in this area.

Conclusion

This workshop demonstrates the potential of online interventions to address barriers to research publication among pharmacy students in Nigeria by significantly reducing their perceived publication needs. While the workshop did not significantly impact writing self-efficacy or apprehension, it highlighted the complex interplay between these factors and the importance of context-specific challenges. Future interventions should consider synchronous components, enhanced support for digital access, and explicit strategies to address writing apprehension, building on these findings to achieve more comprehensive outcomes in similar settings.

Conflict of interest

The authors declare no conflict of interest.

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References

Abdullah, T. H. A., Alsohbo, K. S. I., & Hassan, I. (2022). Gender differences in written communication anxiety among Libyan postgraduates in Malaysia. *Arab World English Journal*, **13**(3), 285–295. https://doi.org/10.24093/awej/vol13no3.18

Aguboshim, F. C., Onwuka, I. N., & Oboti, N. P. (2021). Factors challenging research and innovation in tertiary education in Nigeria. *World Journal of Advanced Research and Reviews*, **10**(1), 224–229. https://doi.org/10.30574/wjarr.2021.10.1.0167

Al-Busaidi, I. S., Wells, C. I., & Wilkinson, T. J. (2019). Publication in a medical student journal predicts short- and long-term academic success: A matched-cohort study. *BMC Medical Education*, **19**(1), 271. https://doi.org/10.1186/s12909-019-1704-x

Allagui, B. (2024). A scaffolding intervention to improve self-efficacy in source-based argumentative writing. *Frontiers in Psychology*, **15**, 1454104. https://doi.org/10.3389/fpsyg.2024.1454104

Alsulami, A. F., Khaimi, Z. O., Hadi, M. A., Aljabri, Y. H., Mayet, T. S., & Althubaiti, A. (2023). "Publish or Perish": Barriers to research publication in an undergraduate medical research program. *BMC Research Notes*, **16**(1), 269. https://doi.org/10.1186/s13104-023-06542-5

Aluh, D., & Adibe, M. (2021). It is time to demystify research and publishing in Africa's undergraduate pharmacy education. *Strides in Development of Medical Education*, **18**(1). https://doi.org/10.22062/sdme.2021.195917.1052

Asghari, S., Price, J., Anaraki, N. R., Mariathas, H. H., Bethune, C., Graham, W., & Graham, A. (2022). The shift to online delivery of a rural faculty development program in research skills: Lessons learned. *BMC Primary Care*, **23**(1), 337. https://doi.org/10.1186/s12875-022-01943-0

Autman, H., & Kelly, S. (2017). Reexamining the writing apprehension measure. *Business and Professional Communication Quarterly*, **80**(4), 516–529. https://doi.org/10.1177/2329490617691968

Bandura, A. (1977). *Social learning theory.* (pp. viii, 247). Prentice-Hall.

Berdanier, C. G. P., & Zerbe, E. (2018). Correlations between graduate student writing concepts and processes and certainty of career trajectories. *2018 IEEE Frontiers in Education Conference (FIE)*, 1–8. https://doi.org/10.1109/FIE.2018.8658678

Bray, N. J., & Braxton, J. M. (2022). Editor's note. *Innovative Higher Education*, **47**(6), 897–900. https://doi.org/10.1007/s10755-022-09630-9

Buckley, C., Saetnan, E., Gerber, A., Cheetham, J., Price, T., Kenyani, J., & Greaves, A. (2021). Impact of writing workshops on doctoral student wellness. *Journal of Learning Development in Higher Education*, **20**. https://doi.org/10.47408/jldhe.vi20.593

Busse, C. E., Anderson, E. W., Endale, T., Smith, Y. R., Kaniecki, M., Shannon, C., & August, E. T. (2022). Strengthening research capacity: A systematic review of manuscript writing and publishing interventions for researchers in low-income and middle-income countries. *BMJ Global Health*, **7**(2), e008059. https://doi.org/10.1136/bmjgh-2021-008059

Collins, P., Leo, M. S., Eslami, M., Hebert, M., Levine, J., & Lee, J. W. (2024). The motivational beliefs and attitudes about writing of international students enrolled in online academic English classes during the COVID-19 pandemic. *Frontiers in Psychology*, **14**, 1232664. https://doi.org/10.3389/fpsyg.2023.1232664

Cossio-Alva, B., Corrales-Reyes, I. E., Pares-Ballasco, G., Luna-Mazzola, I., Sánchez-Ormeño, J., Laura-Lopez, N., Villegas-Maestre, J. D., & R Mejia, C. (2023). Characteristics of undergraduate dental theses defended in Peruvian licensed universities and factors associated with their publication. *Frontiers in Education*, **8**, 1291221. https://doi.org/10.3389/feduc.2023.1291221

Daly, J. A., & Miller, M. D. (1975). The empirical development of an instrument to measure writing

apprehension. *Research in the Teaching of English*, **9**(3), 242–249. https://doi.org/10.58680/rte197520067

Gumusoglu, S. B., Soulinthavong, M. N., & Barr, J. (2022). A WINning approach: Teaching science communication skills through small-group workshops. *Higher Learning Research Communications*, *12*(2), 23–44. https://doi.org/10.18870/hlrc.v12i2.1342

Igiri, B. E., Okoduwa, S. I. R., Akabuogu, E. P., Okoduwa, U. J., Enang, I. A., Idowu, O. O., Abdullahi, S., Onukak, I. E., Onuruka, C. C., Christopher, O. P. O., Salawu, A. O., Chris, A. O., & Onyemachi, D. I. (2021). Focused research on the challenges and productivity of researchers in Nigerian academic institutions without funding. *Frontiers in Research Metrics and Analytics*, **6**, 727228. https://doi.org/10.3389/frma.2021.727228

Jiang, H. (2025). Enhancing college English writing through self-efficacy-based instruction. *Frontiers in Psychology*, **16**, 1668324. https://doi.org/10.3389/fpsyg.2025.1668324

Kiguli-Malwadde, E., Forster, M., Eliaz, A., Celentano, J., Chilembe, E., Couper, I. D., Dassah, E. T., De Villiers, M. R., Gachuno, O., Haruzivishe, C., Khanyola, J., Martin, S., Motlhatlhedi, K., Mubuuke, R., Mteta, K. A., Moabi, P., Rodrigues, A., Sears, D., Semitala, F., … Suleman, F. (2023). Comparing in-person, blended and virtual training interventions; a real-world evaluation of HIV capacity building programs in 16 countries in sub-Saharan Africa. *PLOS Global Public Health*, **3**(7), e0001654. https://doi.org/10.1371/journal.pgph.0001654

Kostić Bobanović, M. (2016). Investigation of university students' EFL writing apprehension: A longitudinal study in Croatia. *Review of Innovation and Competitiveness*, **2**(1), 5–18. https://doi.org/10.32728/ric.2016.21/1

Limpo, T. (2018). Development of a short measure of writing apprehension: Validity evidence and association with writing frequency, process, and performance. *Learning and Instruction*, **58**, 115–125. https://doi.org/10.1016/j.learninstruc.2018.06.001

McCaul, M., Durao, S., Kredo, T., Garner, P., Young, T., & Rohwer, A. (2021). Evidence synthesis workshops: Moving from face-to-face to online learning. *BMJ Evidence-Based Medicine*, **26**(5), 255–260. https://doi.org/10.1136/bmjebm-2020-111394

McLellan, G., Smith, M., Hardy, A., Murray, R., & Thow, M. (2024). Developing early career researchers' self-efficacy for academic writing. *Journal of Academic Writing*, **14**(2), 1–15. https://doi.org/10.18552/joaw.v14i2.1142

Meza, P., & González, M. (2020). Construction and validation of the self-efficacy scale for disciplinary academic writing. *Cogent Education*, **7**(1), 1830464. https://doi.org/10.1080/2331186X.2020.1830464

Mitchell, K. M., Harrigan, T., Stefansson, T., & Setlack, H. (2017). Exploring self-efficacy and anxiety in first-year nursing students enrolled in a discipline-specific scholarly writing course. *Quality Advancement in Nursing Education - Avancées En Formation Infirmière*, **3**(1). https://doi.org/10.17483/2368-6669.1084

Mitchell, K. M., McMillan, D. E., Lobchuk, M. M., Nickel, N. C., Rabbani, R., & Li, J. (2021). Development and validation of the Situated Academic Writing Self-Efficacy Scale (SAWSES). *Assessing Writing*, **48**, 100524.

Mitchell, K. M., Zumbrunn, S., Berry, D. N., & Demczuk, L. (2023). Writing self-efficacy in postsecondary students: A scoping review. *Educational Psychology Review*, **35**(3), 1–45. https://doi.org/10.1007/s10648-023-09798-2

Mwangi, E. M., Iseme-Ondiek, R. A., Riang'a, R. M., Orwa, J., Njenga, K. W., & Ngugi, A. K. (2024). Addressing barriers to post-graduate research training in low resource settings: An innovative approach in an institution of higher learning in Kenya. *Frontiers in Medicine*, **11**, 1470922. https://doi.org/10.3389/fmed.2024.1470922

Okoduwa, S. I. R., Abe, J. O., Samuel, B. I., Chris, A. O., Oladimeji, R. A., Idowu, O. O., & Okoduwa, U. J. (2018). Attitudes, perceptions, and barriers to research and publishing among research and teaching staff in a Nigerian research institute. *Frontiers in Research Metrics and Analytics*, **3**, 26. https://doi.org/10.3389/frma.2018.00026

Ramos-Villagrasa, P. J., Sánchez-Iglesias, I., Grande-de-Prado, M., Oliván-Blázquez, B., Martín-Peña, J., & Cancer-Lizaga, P. (2017). Spanish version of "Self-Efficacy for Writing Scale" (SEWS). *Anales de Psicología*, **34**(1), 86. https://doi.org/10.6018/analesps.34.1.264931

Raviv, H. (2021). Self-Efficacy before and after An academic writing program and its relation to students' language skill – An action research study. *Journal of Education and Human Development*, **10**(3). https://doi.org/10.15640/jehd.v10n3a5

Rice, M. F. (2023). Leveraging digital literacies to support refugee youth and families' success in online learning: A theoretical perspective using a socioecological approach. *Online Learning*, **27**(3). https://doi.org/10.24059/olj.v27i3.4152

Shea, P. (20230. Introduction to OLJ. *Online Learning*, **27**(3). https://doi.org/10.24059/olj.v27i3.4152

Tella, A., & Onyancha, B. (2021). Scholarly publishing experience of postgraduate students in Nigerian Universities. *Accountability in Research*, **28**(7), 395–427. https://doi.org/10.1080/08989621.2020.1843444

Thompson, A. E., & Cobb, P. J. (2023). Incorporating publication into graduate seminars: A case study with digital reviews in archaeology. *Advances in Archaeological Practice*, **11**(4), 442–451. https://doi.org/10.1017/aap.2023.18

Ukrani, R. D., Shaikh, A. N., Martins, R. S., Fatima, S. S., Naseem, H. A., & Baig, M. A. (2021). Low-cost peer-taught virtual research workshops for medical students in Pakistan: A creative, scalable, and sustainable solution for student research. *BMC Medical Education*, **21**(1), 557. https://doi.org/10.1186/s12909-021-02996-y

Yan, L., & Zhiping, W. (2023). Mapping the literature on academic publishing: A bibliometric analysis on WOS. *Sage Open*, **13**(1), 21582440231158562. https://doi.org/10.1177/21582440231158562

Zhang, H., Xu, X., Lei, V. N.-L., Hong, W. C. H., & Jie, W. (2025). Academic writing challenges and supports for early-stage Chinese postgraduates: A mixed-methods study on teaching-research integration, supervisor engagement, and

self-efficacy. *PLOS ONE*, **20**(2), e0317470.
https://doi.org/10.1371/journal.pone.0317470

Appendix A: Schedule for the online workshop for pharmacy students

Below is the schedule for the online workshop for pharmacy students on research publication.

Dear Participants,

Congratulations on being selected for the online research publication mentorship!

To make the most of this programme, you should be prepared to be an active learner and participate fully in the various learning sessions. Remember the points from the video on ***"how to be a good mentee".***

Below is the schedule for the programme. Use it as a guide and draft your work schedule to enable you to send your manuscript to the target journal within the time frame. Each module will be recorded, and the link to the file will be shared on the respective days by 9 am. Endeavour to be punctual in attending the lectures and carrying out the tasks for the respective days. Nothing stops you from doing the tasks on the same day as the modules. The tasks are meant to be done before midnight of that day.

Please do not share the contents of this programme with anyone. You can reach out if you have any questions.

All the best.

Date	Title	Comments
1/10/24 Tuesday	Module 1	Literature search strategy
2/10/24 Wednesday	Task 1	Reference manager, Topic, PICO/PEO, 1 similar sample article, at least 10 articles/sources each for background, methods and discussion (minimum total = 31 articles)
3/10/24 Thursday	Module 2	Publishing ethics
4/10/24 Friday	Task 2	Personal reflections and journalling, identify your co-authors
5/10/24 Saturday	Module 3	Suitable journal identification
6/10/24 Sunday	Break	Catch up on pending tasks (optional)
7/10/24 Monday	Task 3	Identify five journals and list them in order of preference, choose the 1st and follow the author's guidelines
8/10/24 Tuesday	Module 4	Methods
9/10/24 Wednesday	Task 4	Write the methods section of your manuscript
10/10/24 Thursday	Module 5	Results presentation
11/10/24 Friday	Task 5	Present your results following the author's guidelines
12/10/24 Saturday	Module 6	Discussion
13/10/24 Sunday	Break	Catch up on pending tasks (optional)
14/10/24 Monday	Task 6	Write the discussion section, the limitations of the study and directions for future research, implications for policy
15/10/24 Tuesday	Module 7	Background of the study, statement of the problem, objectives/hypothesis
16/10/24	Task 7	Write the background of the study, statement of the problem, objectives/hypothesis

Date	Title	Comments
Wednesday		
17/10/24 Thursday	**Module 8**	**Abstract**
18/10/24 Friday	**Task 8**	**Write the abstract of the manuscript**
19/10/24 Saturday	**Module 9**	**Manuscript submission process**
20/10/24 Sunday	**Break**	**Catch up on pending tasks (optional)**
21/10/24 Monday	**Task 9**	**Visit the submission portal of your chosen journal and test run without submitting anything yet**
22/10/24 Tuesday	**Module 10**	**Peer review process**
23/10/24 Wednesday	**Task 10**	**Peer review 1**
24/10/24 Thursday	**Task 11**	**Peer review 2**
25/10/24 Friday	**Task 12**	**Corrections on the manuscript**
26/10/24 Saturday	**Task 13**	**Submissions to the journals**
27/10/24 Sunday	**Break**	**Catch up on pending tasks (optional)**
28/10/24 Monday	**Task 14**	**Post intervention survey**
29/10/24 Tuesday	**Task 15**	**Control group survey**
30/10/24 Wednesday	**Task 16**	**Focus group discussion**
31/10/24 Thursday	**Task 17**	**Feedback**