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RESEARCH ARTICLE

The perceptions, confidence and attitudes towards pharmacy practice research: A cross-sectional survey of undergraduate students in public universities in southwest Nigeria

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Abstract

Background: Pharmacy practice research (PPR) is essential for providing evidence-based clinical efficacy and cost-effectiveness information on treatments, informing health policy and driving innovation in professional practice. This study aimed to evaluate the perceptions, confidence and attitudes of pharmacy undergraduates towards PPR in Nigeria. **Methods:** This was a quantitative cross-sectional survey of purposively sampled penultimate and final year pharmacy students enrolled in Bachelor of Pharmacy programs at four pharmacy schools in Nigeria. A validated 37-item self-administered Google-based online questionnaire was used. The Mann-Whitney U test was used to determine the differences in perceptions among the participants based on the type of high school attended. **Results:** Of the 350 participants, 58.9% were aged 21-25 years and 51.7% attended public high schools. Many participants (57.7%) scored between 2.5 and 3.5 which was considered fair while 42.0% scored above 3.5 which was considered good on the perception scale. The mean score was 3.37±0.35. More than half of the participants (59.7%) enjoyed working on a PPR study while 62.3% strongly agreed or agreed that they were confident in their ability to evaluate research findings regarding their application to pharmacy practice. The participants who attended public secondary schools tend to agree with the statement that "research is only done in hospitals" compared to those who attended private schools (p=0.03). **Conclusion:** Many participants had fair perceptions and positive attitudes toward PPR. Less than two-thirds of the participants had confidence in their ability to evaluate PPR findings. Educational policies to promote PPR in pharmacy schools in Nigeria should be implemented.

Introduction

Over the past few decades, there has been a paradigm shift in the pharmacy curriculum from product to more clinically oriented training. This is necessitated by a societal need for a range of pharmacist services including disease management, preventive care, health promotion and ascertaining the cost-effective means of providing the care (Hanna *et al.*, 2016; Garcia-Cardenas *et al.*, 2020). Achieving these societal demands requires a scientific approach and pharmacy students need to acquire skills in pharmacy practice research (PPR) (Bhagavathula *et al.*, 2017).

PPR is defined as a "component of health services research that emphasizes the impact of the practice of pharmacy on the healthcare systems, medicines use, and patient care" (Garcia-Cardenas *et al.*, 2020).

PPR is essential for providing evidence-based clinical efficacy and cost-effectiveness information on treatments, informing health policy and driving innovation and expansion of professional practice (Babar, 2020). Recently, the scope of PPR has expanded to include "practice change and implementation of new services in routine practice" (Garcia-Cardenas et al., 2020). Without PPR, the pharmacy profession stagnates and the potential benefits of expanded

pharmacy care services may elude patients. Many PPRs have shown how certain pharmacy practices can improve patients' healthcare outcomes (Pousinho *et al.*, 2020; Ipingbemi *et al.*, 2021; Coutureau *et al.*, 2022). Others have revealed gaps that need to be filled in pharmacy practice (Wong *et al.*, 2021; Babatunde *et al.*, 2023). The cost-effectiveness of therapy has also been evaluated by researchers in pharmacy practice, all in a bid to improve the healthcare outcomes of patients (Ekwunife *et al.*, 2021; Isah *et al.*, 2023).

In sub-Saharan Africa including Nigeria, many healthcare policies and reforms have been undertaken to improve healthcare access and delivery but with little success. One of the reasons adduced to this success rate is over-reliance on health system research findings from developed countries for application or adaptation in the country (Ngeh, 2019). This approach has failed to provide remedies for the unique health challenges faced by Nigeria and other developing countries (Awofeso *et al.*, 2020). The disease burden and the unique healthcare challenges faced by the developing countries including lack of essential medicines and vaccines may not necessarily be the priority of researchers in the developed countries. It is therefore important that pharmacy schools in developing countries promote practice research among students to improve the health and well-being of their citizens.

Globally, pharmacy schools are accountable for social relevance of their graduate training (Saka *et al.*,2021). Social accountability includes conducting research that addresses the immediate health challenges of citizens. In Nigeria, pharmacy education and practices are evolving. In many Nigerian pharmacy schools, curricular research projects have been implemented for students with a 5-year Bachelor of Pharmacy (BPharm) degree. This department-based project is carried out in the final year of the BPharm degree (NUC, 2007). The concept of PPR is a component of clinical pharmacy courses in the penultimate and final year classes. The few students interested in PPR often carry out small surveys and clinical audits as part of their projects in the Department of Clinical Pharmacy.

In Nigeria, pharmacy schools are transitioning from a 5-year BPharm to a 6-year PharmD degree. The objective of the transition is to achieve a socially accountable and practice-based educational system. However, to achieve this objective there is a need for curriculum reform that deliberately engender students for PPR. There is a dearth of knowledge about pharmacy undergraduates' perceptions and attitudes toward PPR in Nigerian pharmacy schools. This study assessed pharmacy undergraduates' perceptions, confidence and attitudes toward PPR in Nigeria.

Methods

Study design and settings

This was a quantitative cross-sectional survey carried out among pharmacy students using an online-based questionnaire. This study was carried out at Obafemi Awolowo University (OAU), Osun State, established in 1961, University of Lagos (UNILAG), Lagos State established in 1962, University of Ibadan (UI), Oyo State established in 1948, and Olabisi Onabanjo University (OOU) Ogun State, established in 1982. The Federal Government of Nigeria owns OAU, UNILAG and UI while OOU is owned by the Ogun State government. The four universities are among the oldest public pharmacy schools in Nigeria and are located in the southwest region of the country. There are 22 approved pharmacy schools in Nigeria with only six (four public and two private) in southwest Nigeria. However, the two private universities offering BPharm degrees are newly accredited and their students have not reached the penultimate level at the time of this study.

Study population, and inclusion and exclusion criteria

This study included purposively sampled penultimate and final-year pharmacy students with a bachelor's degree at the study sites. These levels of study were included because teaching and learning about research in Nigerian pharmacy schools are usually performed at these levels. Eligible participants who were not available at the study sites during the period of data collection were excluded from the study.

Sample size estimation

The sample size was estimated using the Yamane formula. Based on a total population of 798 students in the 4th and 5th years across the schools, and assuming a 95% confidence level, a 5% margin of error, and a 50% response distribution, the calculated sample size was 260. To account for a potential 20% non-response rate, the final target sample size was adjusted to 312.

Questionnaire design

A 37-item self-administered Google-based online questionnaire was developed after a comprehensive literature review of studies on the topic among similar populations (Getov *et al.*,2014; Kritikos *et al.*, 2015; Bovijn *et al.*, 2017). The survey consisted of an introduction section that outlined the eligibility criteria, objectives of the study, and consent statement.

The questionnaire was divided into 5 sections. Section A consisted of 6 sociodemographic questions, including age, gender, professional degree(s), education level, high school attended, ethnicity and name of the pharmacy school. Section B consisted of 5 dichotomous questions that explore the participants and their previous relationship with research. Section C had 10 questions that evaluated the participants' perceptions of the research. The participants' attitudes toward research were assessed with 8 questions in section D while the remaining 8 questions explored the participants' perceptions of teaching and learning about PPR in the BPharm curriculum. The last 3 sections used 5-item Likert scales ranging from "strongly disagree" to "strongly agree" to grade the participants' responses. The questionnaire was face-validated by two academics with at least 20 years of experience and pre-tested among 20 students at OOU who were subsequently excluded from the main study. The feedback from the pre-test led to the re-wording of two questions which were considered to be ambiguous. The internal consistency of the final questionnaire was evaluated using Cronbach's Alpha test which gave a value of 0.71 (Supplementary 1).

Data collection

Messages were sent to the class representatives at the study sites requesting permission to administer the online survey among their classmates. The hyperlink to the Google form (the survey) was sent to the representatives to be put on the class WhatsApp group and participants were encouraged to respond to the questionnaire. The participants had three weeks to complete the questionnaire. Reminders were sent every week with the caveat that those who had previously responded to the questionnaire should abstain from answering it again.

Data management and analysis

The data were initially collected in Google Sheets and later exported into a Microsoft Excel Worksheet and manually cleaned. The data were double-checked to ensure that there were no errors. The perception section (Section C) containing a Likert scale was ranked (strongly agree =5, agree =4, neutral =3, disagree = 2, and strongly disagree = 1) for a correct response. The mean score for each question was determined. The average score for each participant was determined. A score of less than 2.5 was considered poor, a score between 2.5 and 3.5 (inclusive) was considered fair, and a score greater than 3.5 was considered good. The data were processed using the Statistical Package for Social Sciences version 25 (IBM, Corp.). The data were analysed using descriptive statistics including frequency and percentage. The Mann-Whitney or Kruskal-Wallis test, as appropriate, was used to determine differences in perceptions among groups on a Likert scale.

Ethical consideration

This study was approved by the Ethics Committee of the Olabisi Onabanjo University Teaching Hospital, Sagamu (REF: OOUTH/HREC/580/2023AP). The participants signed an informed consent form which was attached to the questionnaire.

Table I: The sociodemographics of the participants (N=350)

Variables	Group	Frequency	Percentage (%)
Age	16-20	42	12
	21-25	206	58.9
	26-30	93	26.6
	31-35	7	2.0
	36-40	2	0.6
Gender	Male	157	44.9
	Female	193	55.1
Level	400	172	49.1
	500	178	50.9
High school attended	Private	169	48.3
	Public	181	51.7
Ethnicity	Yoruba	250	71.4
	Igbo	69	19.7
	Hausa	13	3.7
	Others	18	5.1
Name of pharmacy School	OOU	123	35.1
	UNILAG	91	26.0
	UI	58	16.6
	OAU	78	22.3

Results

Of the 362 completed copies of the questionnaire returned, only 350 were analysed. Giving a response rate of 96.7%. The remaining 12 did not include vital socio-demographics required for analysis. Many of the participants (206; 58.9%) were aged 21-25 years and 181 (51.7%) attended public high schools (Table I). The majority of the participants (290; 80.0%) had no previous degree, 228 (65.1%) had never been involved in research and 232 (66.3%) had intentions to pursue a postgraduate degree.

The participants' perceptions of the research

Many participants (138; 39.5%) strongly disagreed or disagreed that PPR is only done in hospitals while 144 (41.2%) strongly agreed or agreed that PPR is extremely difficult. Many participants (202; 57.7%) scored between 2.5 and 3.5 points while 147 (42.0%) scored above 3.5 points. The average mean score for the participants was 3.37±0.35. The participants scored lowest in the question "Pharmacy practice research is about documentation of new discoveries in pharmaceutical companies" (2.32±0.99) (Table II).

Table II: Participants' perceptions of the research (N=350)

Questions	SD	D	N	A	SA	Mean ±SD
Pharmacy practice research is only done in hospital	44 (12.6)	94 (26.9)	125 (35.7)	71 (20.3)	16 (4.6)	3.22±1.05
Pharmacy practice research is about distributing questionnaires to communities	36 (10.3)	108 (30.9)	103 (29.4)	90 (25.7)	13 (3.7)	3.18±1.04
Google scholar is a better option than Google when seeking journals	10 (2.9)	26 (7.4)	109 (31.1)	142 (40.6)	63 (18.0)	3.63±0.96
Pharmacy practice research is about the documentation of new discoveries in pharmaceutical companies	8 (2.3)	43 (12.3)	68 (19.4)	164 (46.9)	67 (19.1)	2.32±0.99
Ethics approval is needed before conducting pharmacy practice research	6 (1.7)	48 (13.7)	57 (16.3)	156 (44.6)	83 (23.7)	3.75±1.02
Only lecturers can conduct pharmacy practice research	122 (34.9)	149 (42.6)	36 (10.3)	37 (10.6)	6 (1.7)	3.98±1.01
Pharmacy practice research has attractive incentives	9 (2.6)	43 (12.3)	152 (43.4)	101 (28.9)	45 (12.9)	3.38±0.94
Pharmacy practice research is extremely difficult	13 (3.7)	63 (18.0)	130 (37.1)	121 (34.6)	23 (6.6)	3.22±0.94
Research in pharmacy is about experiments on new drugs	36 (10.3)	116 (33.1)	56 (16.0)	118 (33.7)	24 (6.9)	3.06±1.16
Practice decision-making is based on pharmacy practice research	3(0.9)	21(6.0)	55(15.7)	173(49.4)	98(28.0)	3.98±0.87

SD=Strongly disagree, D= Disagree, N= Neutral, A=Agree, SA= Strongly agree, SD= standard deviation

Many participants (219; 62.6%) strongly agreed or agreed that they would only go into research if it would give them job security. Less than two-thirds of the participants (209; 59.7%) enjoyed working on a pharmacy practice research study and 218 (62.3%) strongly agreed or agreed that they had confidence in their abilities to evaluate research findings regarding their application to pharmacy practice (Table III).

The majority (277; 79.1%) strongly agreed or agreed that more time should be allocated to research in pharmacy practice in the curriculum while 185 (52.8%) strongly agreed or agreed that academic staff discussed their research in class (Table IV).

Participants who attended public secondary schools were more likely to agree that "research is only done in hospitals" compared to those who attended private schools (p=0.03) (Table V).

There was a difference in participants' attitudes toward the statement "I would only go into research if it would give me job security" (p=0.022) (Table VI).

There appears to be a difference in participants' perceptions concerning the statement "Pharmacy practice research projects and training should be incorporated into externship and clinical placements" (p<0.001). The participants based on pharmacy schools differed in their responses to the assertion that "Research in pharmacy practice can improve students' analytical skills (p<0.001) (Table VII).

Table III: The attitudes of respondents towards pharmacy practice research (N=350)

Questions	SD	D	N	A	SA
I enjoy reading pharmacy practice research in journals	13 (3.7)	51 (14.6)	123 (35.1)	155 (44.3)	8 (2.3)
I find people who are involved in pharmacy practice research interesting	6 (1.7)	37 (10.6)	81(23.1)	191(54.6)	35(10.0)
I enjoy listening to or discussing pharmacy practice research studies	3(0.9)	37(10.6)	96 (27.4)	183 (52.3)	31 (8.9)
I enjoy working on a pharmacy practice research study	5 (1.4)	39 (11.1)	97 (27.7)	163 (46.6)	46 (13.1)
I am confident in my ability to design a pharmacy practice research project	7 (2.0)	42 (12.0)	136 (38.9)	138 (39.4)	27 (7.7)
I am confident in my ability to understand research related to pharmacy practice	6 (1.7)	28 (8.0)	98 (28.0)	180 (51.4)	38 (10.9)
I am confident in my ability to evaluate research findings in terms of their application to pharmacy practice	2 (0.6)	37 (10.6)	93 (26.6)	180 (51.4)	38(10.9)
I would only go into research if it would give me job security	5 (1.4)	37 (10.6)	89 (25.4)	155 (44.3)	64 (18.3)

SD=Strongly disagree, D= Disagree, N= Neutral, A=Agree, SA= Strongly agree

Table IV: Participants' perceptions of practice research in the Nigerian pharmacy curriculum (N=350)

Questions	SD	D	N	A	SA
Pharmacy practice research projects and trainings should be incorporated into externship and clinical placements	5 (1.4)	37 (10.6)	89 (25.4)	155 (44.3)	64 (18.3)
Research in pharmacy practice can increase students' knowledge and confidence in pharmacy practice	6 (1.7)	13 (3.7)	48 (13.7)	188 (53.7)	95(27.1)
Research in pharmacy practice can improve students' analytical skills	6 (1.7)	13 (3.7)	56 (16.0)	195 (55.7)	80 (22.9)
More time should be allocated to pharmacy practice research in the pharmacy curriculum	1 (0.3)	12 (3.4)	60 (17.1)	193 (55.1)	84 (24.0)
Pharmacy practice research can provide a clear roadmap in choosing a long-term career for students	1(0.3)	18(5.1)	82(23.4)	183(52.3)	66(18.9)
Academic staff discuss their research in class	20(5.7)	33(9.4)	112(32.0)	144(41.1)	41(11.7)
Pharmacy practice research should be mandated in the undergraduate curriculum	5(1.4)	31(8.9)	102(29.1)	161(46.0)	51(14.6)
Academic staff encourage students to participate in pharmacy practice research	7(2.0)	17(4.9)	65(18.6)	201(57.4)	60(17.1)

SD=Strongly disagree, D= Disagree, N= Neutral, A=Agree, SA= Strongly agree

Table V: High school attended and participants' perceptions of the research (N=350)

Questions	High school attended	N	Mean rank	Z Value	Mann-Whitney U p-value
Research is only done in hospitals	Private Public	169 181	164.06 186.19	-2.126	0.03*
Research is about distributing questionnaires to communities	Private public	169 181	174.68 176.27	-0.153	0.88
Google scholar is a better option than Google when seeking journal	private public	169 181	178.70 172.51	-0.604	0.55
Research is about documentation of new discoveries in pharmaceutical companies	Private public	169 181	181.02 170.34	-1.051	0.29
You need ethics approval before conducting research	Private Public	169 181	185.89 165.80	-1.967	0.05
Only lecturers can conduct research	Private Public	169 181	166.97 183.46	-1.626	0.10
Pharmaceutical research has attractive incentives	Private Public	169 181	184.10 167.47	-1.628	0.10
Research is extremely difficult	Private Public	169 181	188.14 163.70	-2.379	0.02*
Research in pharmacy is about experiments on new drugs	Private Public	169 181	174.60 176.34	-0.168	0.87
Practice decision-making is based on pharmacy practice research	Private Public	169 181	172.68 178.13	-0.545	0.58

*statistically significant

Table VI: Association between pharmacy school and the attitudes of respondents toward the research (N=350)

Questions	Name of pharmacy school	N	Mean Rank	P Value*
I enjoy reading pharmacy practice research in journals	OOU	123	184.07	0.12
	UNILAG	91	178.90	
	OAU	58	182.05	
	UI	78	153.15	
I find people who are involved in pharmacy practice research interesting	OOU	123	192.84	0.002**
	UNILAG	91	149.49	
	OAU	58	162.30	
	UI	78	188.31	
I enjoy listening to or discussing pharmacy practice research studies	OOU	123	187.86	0.259
	UNILAG	91	167.44	
	OAU	58	162.63	
	UI	78	174.98	
I enjoy working on a pharmacy practice research study	OOU	123	190.71	0.134
	UNILAG	91	165.03	
	OAU	58	161.46	
	UI	78	174.17	
I am confident in my ability to design a pharmacy practice research project	OOU	123	182.55	0.747
	UNILAG	91	170.32	
	OAU	58	176.15	
	UI	78	169.94	
I am confident in my ability to understand research related to pharmacy practice	OOU	123	181.96	0.111
	UNILAG	91	187.50	
	OAU	58	153.16	
	UI	78	167.94	
I am confident in my ability to evaluate research findings in terms of their application to pharmacy practice	OOU	123	183.74	0.229
	UNILAG	91	183.02	
	OAU	58	168.04	
	UI	78	159.28	
I would only go into research if it would give me job security	OOU	123	166.73	0.022**
	UNILAG	91	185.13	
	OAU	58	203.16	
	UI	78	157.53	

*Kruskal-Wallis p-value; **statistically significant
Lowest mean rank indicates those who mostly agreed with corresponding statement; Highest mean rank suggests those who least agreed with corresponding statement; UI=University of Ibadan; OOU= Olabisi Onabanjo University; UNILAG=University of Lagos; OAU= Obafemi Awolowo University

Table VII: The participants' perceptions of pharmacy practice research in the pharmacy curriculum (N=350)

Questions	Name of pharmacy school	N	Mean Rank	P Value*
Pharmacy practice research projects and training should be incorporated into externship and clinical placements	OOU	123	196.70	<0.001**
	UNILAG	91	135.34	
	OAU	58	166.78	
	UI	78	195.40	
Research in pharmacy practice can increase students' knowledge and confidence in pharmacy practice	OOU	123	187.88	0.253
	UNILAG	91	162.91	
	OAU	58	172.63	
	UI	78	172.80	
Research in pharmacy practice can improve students' analytical skills	OOU	123	202.59	<0.001**
	UNILAG	91	141.50	
	OAU	58	166.08	
	UI	78	179.46	
More time should be allocated to research in pharmacy practice in the curriculum	OOU	123	191.05	0.054
	UNILAG	91	156.49	
	OAU	58	171.13	
	UI	78	176.40	
Pharmacy practice research can provide a clear roadmap in choosing a long-term career for students	OOU	123	184.69	0.093
	UNILAG	91	163.10	
	OAU	58	192.91	
	UI	78	162.53	
Academic staff discuss their research in classes	OOU	123	188.75	0.114
	UNILAG	91	156.65	

	OAU	58	173.59	
	UI	78	178.02	
Pharmacy practice research should be mandated in the undergraduate curriculum	OOU	123	185.54	0.54
	UNILAG	91	169.18	
	OAU	58	171.65	
	UI	78	169.90	
Academic staff encourage students to participate in pharmacy research	OOU	123	185.95	0.10
	UNILAG	91	164.38	
	OAU	58	185.95	
	UI	78	161.51	

Note:*Kruskal-Wallis p-value **statistically significant; UI=University of Ibadan; OOU= Olabisi Onabanjo University; UNILAG=University of Lagos; OAU= Obafemi Awolowo University

Discussion

This study aimed to evaluate the perceptions, confidence and attitudes of pharmacy undergraduate students toward PPR. This study showed that many participants had fair perceptions of and positive attitudes toward PPR. Although many had confidence in their ability to conduct PPR, they would adopt PPR as a career only if it provided job security.

Just above half of the participants had fair perceptions of PPR in contrast to the findings of a similar study that reported poor knowledge among undergraduate medical students in Arab countries (Assar *et al.*, 2022). Many of the participants appeared to have good perceptions of certain components of PPR including literature review, ethical requirement and outcome of PPR. However, it seems that many did not have a grasp of the methodology and purpose of PPR as could be seen in their response to questions on the distribution of questionnaires as a method and documentation of new discoveries in pharmaceutical companies. This deficiency can be addressed through well-structured mentoring in which academics involved in PPR expose students to practice research activities through "hands-on training" and a constructive socialization process. Teaching pedagogy in pharmacy schools may need improvement. Incorporating videos, interactive tutorials and experiential training earlier in the pharmacy school curriculum could help (Kritikos *et al.*, 2015).

The majority of the participants disagreed or strongly disagreed that only lecturers can conduct PPR. This finding is consistent with a similar study among pharmacists in Nigeria (Fakeye *et al.*, 2017). This finding is commendable and may be a positive factor towards entrenching research in real practice. When students learn in school that setting practices are not a barrier to PPR, they may be more encouraged to apply research in practice. This study, however, revealed that most of the participants were undecided concerning the assertion that "pharmacy practice has attractive incentives". This finding may be a limiting factor for the adoption of PPRs in real practice. The lack of incentives including research funding has been previously highlighted as a barrier to research among pharmacists in Ethiopia and Nigeria (Bhagavathula *et al.*, 2017; Shitu *et al.*, 2019).

Many participants perceived PPR to be extremely difficult, although this observation was associated with high schools (whether public or private) attended by the participants. This finding is consistent with many reports on PPR among pharmacy students in Australia, Saudi Arabia, and among pharmacists in Nigeria (Kritikos *et al.*, 2015; Shitu *et al.*, 2019; Al-Arifi, 2019). This finding although not absolutely true may be due to the students' observation of the difficulties their lecturers face in conducting research without adequate resources or funding. Many lecturers in pharmacy schools fund their research through the monthly meagre salary and this limits their capacity for robust interventional and implementation research (Baro *et al.*, 2017). Difficulty in accessing patients and their records in many hospitals due to professional rivalry among healthcare professionals in Nigeria may also be a factor influencing their perception (Adisa & Anifowoshe, 2019).

A large proportion of the participants perceived PPR to be about distributing a questionnaire. This perception reflects inadequate knowledge of PPRs. The participants' perceptions could have been due to their experiences conducting PPRs at Nigerian universities. Previous studies have reported that most PPR studies in low and middle-income countries including Nigeria are surveys and cross-sectional and very few implementation studies have been conducted in these countries (Bhagavathula *et al.*,2017; Gebremariam and Gadisa, 2021; Assar *et al.*, 2022).

In this study, many of the participants had positive attitudes toward PPR. This can be deduced from the participants' self-reported disposition to read PPR studies in journals and to engage researchers in PPR (Table 3). This finding is consistent with a report among community pharmacists in Ethiopia and Jordan and medical students in Jordan (Bhagavathula *et al.*, 2017;

Alefishat *et al.*,2022; Abusamak *et al.*, 2024). However, many participants would consider job security before taking research as a career, even though they had confidence in their ability to do research. This observation has been previously reported and should be a concern to the government, education policy managers and funders (Murray *et al.*, 2020). Situations in which lecturers and researchers in Nigeria had to be on industrial action for a long period to demand better working conditions is de-motivating to prospective researchers. Experiences such as this could have influenced the participants' responses on this issue.

In this study, many participants were confident in their ability to design, understand and evaluate the PPR findings. However, a review of studies on pharmacists' confidence in conducting PPR was inconsistent (Reali *et al.*, 2021). The finding of this study is in line with a report among pharmacists in Qatar (Awaisu *et al.*, 2015). However, the finding of this study could be due to the continuous improvement in curriculum development. The current BPharm curriculum, introduced in 2007, includes a PPR teaching component, unlike the earlier version. Although the content and time allocation are limited, this addition likely helped boost participants' confidence.

In this study, more than half of the participants agreed or strongly agreed that academics discuss their research in class. The social influence of lecturers in determining the future careers of students has been highlighted in the literature (Reali *et al.*, 2021; Arbab *et al.*, 2022). Academics by discussing their research and outcomes in class may indirectly influence the career choices of many students (Padilla *et al.*, 2020). Carter et al. (2016) found that simply exposing students to PPR had little influence on their intention to pursue a career in PPR. They argued that students would only be motivated when faculty members focus on improving students' technical competence in PPR and expose them to successes that may be achieved through ground-breaking publications, awards and grants.

Limitations

This study is perhaps the first to evaluate PPR among pharmacy students in Nigeria. Many of the previous studies evaluated the subject among practitioners. The study was carried out in four of the oldest pharmacy schools in Nigeria that were involved in the teaching and implementation of PPR. This study identified some areas of weakness in teaching and learning PPR in the current BPharm curriculum in Nigeria. Going forward, apart from didactic teaching of research methodology, "hands-on" mentoring of students by academic staff is a way to go. Sessions for academic staff to discuss their research and to deliberately showcase the benefits and prospects of a career in PPR to students should also be incorporated into the new PharmD curriculum. Students should also be given the opportunity to choose their research mentors at the undergraduate level unlike what is presently obtainable in many pharmacy schools in Nigeria. The study findings can assist the stakeholders in pharmacy education to improve the curriculum to produce future researchers in pharmacy practice.

Despite these strengths, however, the study has several limitations. This was a cross-sectional study that did not allow for an in-depth evaluation of the participants. The data collection using an online platform might have resulted in an overestimation of the variables. The confidence reported in the study was self-determined and could have been grossly overrated. The study was carried out in only four public universities in the southwest of Nigeria. This may limit the generalizability of the findings to the entire pharmacy students in Nigeria. Longitudinal or intervention-based studies to explore change in perception and belief in PPR among students are desirable.

Conclusion

Many of the participants had fair perceptions of PPR and reported self-confidence about interpreting PPR in practice. The majority of the participants had positive attitudes toward PPR but were skeptical about PPR providing attractive incentives to professionals. The lack of funding for PPR may be a barrier towards adopting it in real practice.

Conflict of interest

The authors declare no conflict of interest.

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Appendix A: Questionnaire

NIGERIAN PHARMACY STUDENTS' PERCEPTIONS AND ATTITUDES TOWARDS PHARMACY PRACTICE RESEARCH

Dear respondent,
This survey is being conducted to identify the factors that are influencing Nigerian pharmacy students attitudes towards pharmacy practice research at undergraduate level.
The questions below are asked to understand the perspectives of the respondents based on their demography, attitudes and possible factors that could influence their decisions. Please do understand that these are for research purposes and your responses are highly confidential and would be treated as such.
Also, this is a voluntary survey participation and your cooperation would be appreciated.
Your honest response is also important and needed.
Thank you.
NB: PLEASE THIS SURVEY IS STRICTLY FOR PHARMACY STUDENTS IN NIGERIA

SECTION A: Demographics: Tick the most appropriate [√]

1. Age: 16-20 [ ] 21-25 [ ] 26-30 [ ] 31-35 [ ] 36-40 [ ]

2. Gender: Male [ ] Female [ ] Non-Specific/others [ ]

3. Level: 400 [ ] 500[ ]

4. High School Attended: Private [ ] Public [ ]

5. Ethnicity: Yoruba [ ] Igbo [ ] Hausa [ ] Others [ ]

6. Name of Pharmacy School: OOU [ ] UNILAG [ ] UI [ ] OAU [ ]

SECTION B: Previous Relationship with Research

7. Previous degree: Yes [ ] No [ ]

8. Involved in research before: Yes [ ] No [ ]

9. Friends Involved in Research: Yes [ ] No [ ]

10. Parents working in research or has worked in a research environment: Yes [ ] No [ ]

11. Intend to pursue a postgraduate degree in pharmacy: Yes [ ] No [ ]

PART C: Participants' perceptions on Pharmacy Practice Research

Please indicate your preferred answer with the statement using a 5-point scale (circle a number): 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

S/N	Questions	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
12	Pharmacy practice research is only done in hospital					
13	Pharmacy practice research is about distributing questionnaires to communities					
14	Google scholar is a better option than Google when seeking journals					
15	Pharmacy practice research is about the documentation of new discoveries in pharmaceutical companies					
16	Ethics approval is needed before conducting pharmacy practice research					
17	Only lecturers can conduct pharmacy practice research					
18	Pharmacy practice research has attractive incentives					
19	Pharmacy practice research is extremely difficult					
20	Research in pharmacy is about experiments on new drugs					
21	Practice decision-making is based on pharmacy practice research					

PART D: Attitudes of respondents towards research

Please indicate your preferred answer with the statement using a 5-point scale (circle a number): 5= Strongly Disagree, 4= Disagree, 3=Neutral, 2=Agree, 1=Strongly Agree.

S/N	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
22	I enjoy reading pharmacy practice research in journals					
23	I find people who are involved in pharmacy practice research interesting					
24	I enjoy listening to or discussing pharmacy practice research studies					
25	I enjoy working on a pharmacy practice research study					
26	I am confident in my ability to design a pharmacy practice research project					
27	I am confident in my ability to understand research related to pharmacy practice					
28	I am confident in my ability to evaluate research findings in terms of their application to pharmacy practice					
29	I would only go into research if it would give me job security					

SECTION E: Participant's perceptions of teaching and learning Pharmacy Practice Research in Nigeria

Please indicate your preferred answer with the statement using a 5-point scale (circle a number): 5= Strongly Disagree, 4= Disagree, 3=Neutral, 2=Agree, 1=Strongly Agree.

S/N	Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

30	Pharmacy practice research projects and trainings should be incorporated into externship and clinical placements	
31	Research in pharmacy practice can increase students' knowledge and confidence in pharmacy practice	
32	Research in pharmacy practice can improve students' analytical skills	
33	More time should be allocated to pharmacy practice research in the pharmacy curriculum	
34	Pharmacy practice research can provide a clear roadmap in choosing a long-term career for students	
35	Academic staff discuss their research in class	
36	Pharmacy practice research should be mandated in the undergraduate curriculum	
37	Academic staff encourage students to participate in pharmacy practice research	