

RESEARCH ARTICLE

Challenges encountered by student pharmacists undertaking a research project at one school of pharmacy in the United States

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Abstract

Background: There is a lack of research exploring the challenges encountered by student pharmacists undertaking a research project. This information is needed to optimise the curriculum and improve the students' learning experience. This study explored the challenges encountered when undertaking a research project from the student pharmacists' perspective. **Methods:** Qualitative semi-structured interviews were conducted online with fourth-year student pharmacists at one United States College of Pharmacy during Winter 2024 and Spring 2025. Interviews were conducted by neutral, trained researchers following the interview guide. Interviews were audio recorded and transcribed, then thematically analysed by independent researchers to code the data and identify themes. **Results:** Overall, 11 student pharmacists participated in the semi-structured interviews. Two themes representing intrinsic factors and extrinsic factors that caused challenges in completing a research project in the pharmacy program were identified. Theme 1 (intrinsic factors) included students' lack of research interest and competing priorities. Theme 2 (extrinsic factors) included lack of research support and difficulty navigating the institutional review board process. **Conclusion:** The findings of this qualitative analysis may be helpful for curriculum committees to help improve student pharmacists' learning experiences. Additional research is warranted to investigate additional avenues of the pharmacy research project process.

Introduction

Colleges of Pharmacy typically have ongoing processes to evaluate areas for improvement in the pharmacy curriculum at their institutions. Over the past several years, the University of Arizona R. Ken Coit College of Pharmacy (UARKCCOP) curriculum committee has revised the research project course series in an attempt to improve the overall student learning experience. Student feedback suggests that students continue to face challenges with completing a research project as a required component of the Doctor of Pharmacy (PharmD) curriculum.

For brief context, all student pharmacists at the UARKCCOP undertake a required research project in the final three semesters of the four-year PharmD programme. The types of research projects can span any aspect of pharmacy or healthcare research, including but not limited to clinical practice research, pharmacy education, and laboratory-based projects. Regardless of study design, projects should typically involve the need for a review of the literature, development of a research question with specific aims, Institutional Review Board (IRB) approval, appropriate methods to collect and analyse data, and presentation of the findings.

Early in the third year of the programme, the research project course coordinator gives a presentation in another class to orient students to the upcoming research project course series and to encourage them to think about project ideas, advisors, and teams. Students are provided with the course requirements, template materials, and examples of previous projects. In the third year Spring semester, students select a project, project advisor, and project team (though some students choose to work individually), and participate in a required two-credit-hour in-person course that teaches them how to write a research proposal and prepare an IRB submission. For this course, students would typically be expected to commit two hours per week to class time, and an additional four hours per week outside of class to developing their research proposal over the 15-week semester (for a total of 90 hours).

In the fourth year Fall semester, students enrol in a one-credit-hour distance-learning course (approximating 45 hours of work per semester) and are expected to obtain IRB approval and to begin data collection. In the fourth year Spring semester, students enrol in a final one-credit-hour distance-learning course (approximating 45 hours of work per semester) and are expected to complete data collection, conduct data analysis, and present a poster of their findings. Of course, the nature of conducting a research project means that some activities may occur sooner or later, and take more or less time, between student teams. The fourth-year courses are designed flexibly for distance learning to enable students to complete their projects alongside their Advanced Pharmacy Practice Experiences (APPEs). Students do not meet for class during the fourth year but are expected to engage with their teams and project advisors as appropriate. The research project course coordinator is available throughout the process to provide additional support as needed. The poster session is held in the final week of the semester after APPEs have concluded.

A recent narrative review presented the limited published literature regarding research projects in United States (US) pharmacy curricula (Axon et al., 2024). This review highlighted that most published literature describes the types of research projects undertaken by students, whether the projects are required or elective components of the curriculum, timing and time commitment in the curriculum, and project deliverables. However, there is a lack of studies focused on student pharmacists' experiences of the challenges they encounter while completing a research project in the PharmD curriculum.

To better support students through the research project process, it is necessary to understand their

perspectives of the challenges they encounter. This information may be helpful to make meaningful improvements to the research project courses for students in the PharmD curriculum. The objective of this qualitative study was to explore the challenges encountered by fourth-year student pharmacists undertaking a research project at one College of Pharmacy in the US.

Methods

This qualitative study involved conducting semi-structured interviews with fourth-year student pharmacists in the graduating class of 2025 at the UARKCCOP. This study design was chosen because it allows researchers to gain a rich understanding of student's perspectives and experiences. A semi-structured interview guide was developed for this project by the research team based on published scholarly articles and faculty experience coordinating the pharmacy research project course (Kim et al., 2010; Cailor et al., 2017; Axon, Campbell, & Warholak, 2019; Axon & Whaley, 2022; Axon, 2023). The interview guide was iteratively developed through several rounds of discussion among the research team members until the final version was agreed upon. The interview guide began with a paragraph to introduce the interviewer and the purpose of the project, details about the process for conducting the interviews, and a reminder that the interviews would be recorded, transcribed and analysed anonymously. The first interview question asked participants to describe their experience completing a research project in the PharmD curriculum. This question was designed to be broad, to orient the interviewee to the interview topic, and to identify potential probing questions to ask in the interview. The second question asked participants to describe how they conducted the various research project tasks, if they developed any strategies, and which aspects were particularly challenging. The third and fourth questions asked about aspects of professional development and the value of the research project in the PharmD curriculum, while the fifth question offered an opportunity for students to share anything else that had not been covered in the main questions. No substantive changes were made to the interview guide as the interviews were conducted, although the interview guide allowed for further probing questions to be asked throughout the interviews as necessary.

All students in this cohort were eligible to participate. Throughout Winter 2024 and Spring 2025, four recruitment emails were periodically sent by the

principal investigator (DRA) to all fourth-year students at the UARKCCOP (n = 126) inviting them to voluntarily participate in the study (one initial email and three reminder emails). The recruitment email contained a link for interested students to provide their name and email address. Potential participants were informed that the interviews would likely take up to 30 minutes of their time to complete. No incentives (financial, grades, or otherwise) were offered for study participation. All students who agreed to participate before data collection stopped were interviewed. Data collection continued until no new codes were identified in the data analysis process and thus a sufficient corpus of data was obtained. Online (Zoom®) interviews were scheduled at a mutually convenient time and were led by a trained researcher (BE) who was not a faculty member at the College and did not know the participants to prevent bias. Student pharmacist researchers who had received qualitative training provided additional support with the interviews (HB, HS, JP, KT). These students were not in the same cohort as those eligible for participation in this study, though it is possible they may have known some of the participants. The principal investigator (DRA) was the research project course coordinator and was not involved in conducting the interviews. This researcher only saw de-identified transcripts to support with seeking consensus during the data analysis and interpretation process. All interviews were audio-recorded and later transcribed on a rolling basis for thematic analysis.

The thematic analysis followed the six stages of the Braun and Clarke methodology (Braun & Clarke, 2006; Cernasev & Axon, 2023). This involved the researchers reading each transcript to familiarise themselves with the content and then generating a set of primary codes based on the data in the transcripts. Next, the researchers searched for themes within the codes, reviewed the themes, and provided a definition and description for each theme. To provide a framework for organisation and interpretation of themes in this analysis, the themes represented intrinsic or extrinsic factors that influenced challenges for completing a pharmacy research project. Finally, representative excerpts from the interview transcriptions were provided to exemplify the study narrative. Two researchers (AM, MS) independently developed their own inductive code lists from all transcripts and then met to reconcile them into one code list with input from additional research team members (DRA, BE) as required. Notes were kept in the analysis software by the researchers throughout the analysis process. At all stages of the analysis process, any differences were resolved through discussion until consensus was achieved. Transcripts and findings were not returned to

participants. Data analysis was supported by Dedoose software (Version 10.0.35, Los Angeles, CA: SocioCultural Research Consultants, LLC, 2005). This study was approved by the University of Arizona Institutional Review Board (IRB; approval #00004686). All participants gave informed consent before taking part in the study and completed a short demographic questionnaire at the end of the interview.

Results

Eleven students participated in the interviews. Participants were most commonly aged between 25 - 29 years (n = 6), while the remainder were 20 - 24 years (n = 2) or 30+ years (n=2). One participant did not wish to disclose their age. Most participants were female (n = 9), studied at the Phoenix campus (n = 8), and had not worked on a research project before (n = 9). Participants held a bachelor's degree only (n = 4), associate's degree only (n = 3), bachelor's degree and associate's degree (n = 2), or no degree (n = 2). Grade Point Averages (GPAs) in the PharmD programme were in the range of 3.25-3.49 (n = 4), 3.50-3.74 (n = 1), 3.75-3.99 (n = 4), and 4.00 (n = 1), with one participant not providing their GPA. All participants worked on their project as a group (rather than individually).

Two themes, representing intrinsic factors and extrinsic factors that caused challenges in completing a project, were identified in the analysis. Theme 1 represents intrinsic factors and primarily relates to the students' lack of interest in completing a research project as part of the PharmD programme and their competing priorities. Theme 2 represents extrinsic factors and includes lack of research support and difficulty navigating the IRB process. These themes are presented below with sample quotes from the interview transcripts.

Theme 1: Intrinsic factors - lack of research interest

Throughout the interviews, students made statements that recognised the value of research but expressed limited interest in completing a research project in the PharmD programme themselves. This was primarily because it did not align with their career plans or their view of their professional training. One student explained how they preferred to focus on clinical work rather than research work: *"I do think it's important to do research. I just personally don't have an interest in doing the research myself. I would prefer to be more of a like clinical practitioner rather than like a lab researcher. I feel like if I wanted to go into the research route, I would have done more of a PhD."* (Interview 4).

A second student stated that while they may be interested in research later in their career, it was not currently of interest to them at this point in their career: *"It [research] might pique my interest later on. I don't know. I can't see that, but as of right now, it's not my strongest interest."* (Interview 5).

However, another student noted that while they were not interested in a research career, completing a research project in the PharmD programme would help them in a residency programme: *"I would say that I am not inclined to pursue a career in research, but ... as a resident, I'll have to complete similar projects, and so I do feel more prepared to do that."* (Interview 8).

Theme 1: Intrinsic factors - competing priorities

Students talked about balancing multiple obligations and having limited time available to complete a research project in the PharmD programme, and how either the project or other commitments were compromised as a result. For instance, one student shared: *"I think during the P4 year, it [the project] can be a bit more complicated, just because... [the] majority of us will be on our rotations and we'll be in the process of completing... the residency application process, so that's a bit overwhelming. So, I feel the timing of having to do a project during that time isn't really beneficial for us students, because we don't have enough time to really forego putting in a lot of time and effort into the project in order for it to be a success."* (Interview 5).

A second student expressed the difficulties their group experienced trying to find a shared time that could be dedicated to working on the research project: *"With rotations starting in May it was difficult to coordinate with everyone's schedule, because we all had different off blocks and different rotations in terms of difficulty."* (Interview 9).

Another student shared a similar example, where group members had difficulty finding time to meet among everyone's other commitments: *"One of our group members kept pushing the group meeting... we would schedule a meeting next week, and they would be like, 'I can't do this day.' And then we pushed that meeting a couple months... which made it so hard for us to get the project going and to get it submitted to the IRB."* (Interview 7).

Another student described how some of their peers were unable to present their project at a national meeting because they had insufficient time to dedicate to completing their project before the conference deadline: *"I know a couple of people who definitely wanted to be done before Midyear so that they can present. But on their end, they just couldn't get it done,*

just because of like the sheer amount of work it was." (Interview 6).

Theme 2: Extrinsic factors - lack of research support

Students shared instances where there was a lack of support for completing their research project. One student explained how difficult it was to identify a project and project advisor. This student suggested it might be easier to identify an advisor with an ongoing research project that they can join: *"[Project advisors] who may already have research in place and like need students to like help pick it up, I think, would alleviate a lot of stress on the students end because... [there's] a lot of daunting things in a time where we're kind of already like high stress."* (Interview 9).

Related to lack of research support from project advisors, one student described how their project involved one advisor at the college and another at a practice site, but the advisors could not agree on the research plan: *"Having multiple different advisors...it was difficult to get those people on the same page ... it was not conducive to getting things done in a timely manner ... it took probably 4 to 5 months to get them to both agree."* (Interview 11).

Another student talked about the steep learning curve and lack of support for understanding the research process: *"[The research process] can be a little bit complicated at times, because with research it can be a different type of language that people, some people aren't used to."* (Interview 5).

One more student expressed uncertainty about lack of support with data analysis: *"I don't have a lot of experience in research and so I feel... help and resources have been lacking, especially when it comes to the statistics portion. I haven't done statistics in a long time, so it's been a challenge, but interesting at the same time."* (Interview 10).

Theme 2: Extrinsic factors - difficulty navigating the IRB process

Students shared their frustrations with the IRB submission process and with gaining approval for their research project. One student stated: *"The most challenging, I would say, is going through the IRB. I think it's something that's kind of confusing for all of us, and it varies, based on what type of project that we're doing. And sometimes even our like faculty mentors aren't well aware of the process either, or how to go about some of the situations that we come upon when it comes to IRB."* (Interview 3)

This sentiment was echoed by a second student, who acknowledged they had little interest in the IRB process: *"IRB in general is just super confusing and I*

don't know if it's just because I'm not too interested in doing research in the future. But I just believe that it's a little confusing and not as straightforward." (Interview 4)

Another student discussed how their struggle with obtaining IRB approval affected their ability to obtain the data required to complete their project prior to the deadline: *"[In the Spring] semester we started working on the IRB, and we thought we had everything put together and ready to go, but once we submitted the IRB, we weren't hearing anything back... and then we found out we're missing a bunch of stuff... So, we haven't collected any data because we can't send out our survey and things are kind of just up in the air."* (Interview 1).

This view was shared by a further student, who described how the IRB process affected their project timeline: *"We haven't really kind of done our analysis section yet ... and that's in relation to the IRB."* (Interview 2).

Discussion

The analysis of these semi-structured interviews highlighted some of the challenges encountered by student pharmacists as they conducted their required research project in the UARKCCOP PharmD programme. The first intrinsic challenge was a perceived lack of interest in completing a research project. It was encouraging that students often expressed the sentiment that research is important for pharmacy practice and noted that it may help them with residency programme applications. Yet, it was disappointing that many of them did not wish to be involved in the research process, at least at this point in their careers. Previous research corroborates this finding, reiterating the perceived importance of research for the profession of pharmacy, despite students' lack of interest in the activity (Henchey, Keefe, Munger, & Witt, 2020). Pharmacy is a profession steeped in scientific research that continues to evolve. This poses the ongoing question of identifying the appropriate balance between basic science and research exposure as compared to clinical experiences in the PharmD curriculum (Vaidean, Vansal, Moore, & Feldman, 2013; Morbitzer *et al.*, 2021; Khan, Rashrash, Droiu, & Huynh, 2024).

Next, students mentioned having conflicting commitments and a lack of time to complete their research project. Students noted difficulty in finding mutually convenient times to work on their project with group members, advisors, and other

collaborators. Students also mentioned difficulty managing their time to complete their research project alongside their other commitments, such as APPEs, work schedules, board exam preparation, and other life responsibilities. As part of the discussion around the amount of time it takes to complete a research project in the PharmD programme, it may be worth considering the opportunity cost. That is, when only so many things can be included in the curriculum, what opportunities are lost or compromised in order for students to work on a research project? While research may be an important part of the PharmD programme, curriculum considerations should consider if students' time may be better spent on other activities. Likewise, curriculum considerations should consider if the time spent by faculty supporting student research could be applied elsewhere, for instance, facilitating clinical exams, workshops, journal clubs, or experiential practice rotations.

The extrinsic set of challenges identified by students was lack of research support and difficulty navigating the IRB process. This included difficulty identifying a research project topic and limited availability of faculty with research expertise. As ever, faculty have many competing priorities and are not always able to accommodate all the students who wish to conduct research under their mentorship. Likewise, some faculty feel that their expertise is limited with regards to mentoring research projects. At the UARKCCOP, students are required to identify their own project and project advisor (with support from the course coordinator). To help address this challenge, the college may consider identifying available projects and advisors in advance and providing these to students to select from. Students also expressed a lack of resources to help them understand aspects of the research process, in particular the IRB approval process and support for data analysis. This may be unsurprising to many readers, who themselves may have experienced frustrations with the IRB process and lack of statistical support. At the UARKCCOP, increasing efforts have been dedicated to explaining and guiding students through the IRB process. Students are also reminded of the importance of obtaining IRB approval and its role in helping to prevent harm to participants in a study. It may be worth considering innovative, more meaningful, ways for students to interact with the IRB as part of the PharmD curriculum. Similarly, additional workshops have been offered on data analysis. The findings of this study suggest that further work is necessary to support students in these areas moving forward. This could include joint education opportunities and planning sessions for students and project advisors alike.

There was some interaction between the examples of intrinsic and extrinsic factors identified in the results. For instance, when students were not motivated or unable to find sufficient time to work on their research project, this resulted in delays completing tasks such as their IRB submission. This then compounded the challenge that students encountered when trying to obtain IRB approval with even less time to meet their deadline. Likewise, when students expressed that they were not interested in completing a research project, it may have been more difficult to secure the support they needed from their project advisor. Additionally, students lacking research drive may be less able to adapt and respond to setbacks, delays, or challenges experienced throughout the research process.

Although students identified several challenges related to completing a research project in the PharmD programme, that does not mean that research activities should automatically be cut from the curriculum. Instead, this information should help inform curriculum committees as they weigh the advantages and disadvantages of research projects in the pharmacy curriculum. Perhaps it is necessary to focus less on research and more on clinical experiences, or perhaps greater efforts are required to reinvigorate the research opportunities available to students with the intent of increasing interest in research. Alternatively, curriculum considerations should include whether it would be more appropriate to offer research projects as an elective component of the PharmD curriculum (rather than a required component). This would allow students who wish to undertake research the opportunity to do so, and the necessary resources to facilitate this can be focused on fewer students. Meanwhile, the students without an interest in research can pursue other opportunities. While having challenges is not a reason against completing a research project, if sufficient resources (e.g., appropriately qualified faculty, IRB support, timely feedback, data analysis support) cannot be offered to students to meet and overcome these challenges, then perhaps the projects should not be offered. That said, curriculum committees (and the academy more broadly) should consider the knowledge and skills that the next generation of pharmacists would have (or not have) without exposure to research activities, and if that is what the profession wants or needs. All this and more requires careful consideration as pharmacy curriculums are reviewed.

There were some limitations to this thematic analysis of semi-structured interviews. First, the sample of students who participated in the study may not have been representative of all opinions in the student cohort (11 out of 126 potential participants represents a participation rate of 8.7%). It is possible that only

students with a particularly positive or negative perceptions of their research project experience agreed to participate, resulting in the possibility for self-selection bias. Second, the cross-sectional nature of the study design represents students' views at one point in time. These views may change as their experience with their projects evolves, or as they gain opportunities to apply their research skills in future. Third, the inclusion of students from only one college of pharmacy limits the external application of the findings. A description of the research project course requirements at the UARKCCOP is provided in this paper for readers to compare to their own institution.

Conclusion

This study found intrinsic and extrinsic factors that represented two main themes from students about the challenges they encounter when conducting a research project in the PharmD programme. These included students' lack of interest in completing a research project as part of the PharmD programme, competing priorities, lack of research support, and difficulty navigating the IRB process. These findings should be considered to help improve student pharmacists' learning experiences. Additional research is warranted to explore other avenues of the PharmD research process.

Conflict of interest

Dr. Axon reports grant funding from the American Association of Colleges of Pharmacy, Arizona Department of Health, Merck & Co., National Council for Prescription Drug Programmes Foundation, Pharmacy Quality Alliance, Tabula Rasa HealthCare Group and the US Department of Health and Human Services, outside of this study. The remaining authors have no conflicts of interest to disclose.

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Ethical approval

This study was approved by the University of Arizona Institutional Review Board (approval #00004686). All

participants gave informed consent before taking part in the study.

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