Exploring Residency Program Directors, Preceptors, and Residents' Intentions to Participate in Multicenter Pediatric Pharmacy Resident Research Projects

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OBJECTIVE The purpose was to explore preceptors, residency program directors (RPDs), and residents' beliefs and intentions in participating in multicenter pediatric resident research projects (PRRPs).

METHODS This exploratory qualitative study used the theory of planned behavior to explore beliefs, attitudes, and intentions toward participation in a multicenter PRRP. Two focus groups were formed: RPDs/preceptors and pharmacy residents. The primary objective was to identify attitudes/salient beliefs, subjective norms, and perceived behavioral controls regarding participation in multicenter PRRPs. The secondary objectives included identifying potential barriers and mitigation strategies for multicenter PRRPs. Descriptive statistics and a thematic analysis were performed.

RESULTS The 2 focus groups included 24 participants: RPDs/preceptors ($n = 16$) and pharmacy residents ($n = 8$). The RPD/preceptor group had a mean of 7.4 ± 5.4 years of research experience; all residents had prior research experience as students. Participants shared and contrasted their salient beliefs, subjective norms, and perceived behavioral control beliefs about logistical challenges, networking, mentoring, sample size, collaboration, workload, shared responsibilities for data collection and the institutional review board application, and resources associated with participation in multicenter PRRPs. Other items that participants felt were important were discussion of authorship order and dedicated research time for residents.

CONCLUSIONS Participants provided favorable comments toward multicenter PRRPs but acknowledged some barriers. The resident, preceptor, and RPD intention to participate in multi-center PRRPs is very likely if they perceive this as an opportunity for increased networking and mentorship, increased likelihood of publication, enhanced research skill experience, and shared resources and responsibilities.

ABBREVIATIONS ASHP, American Society of Health-System Pharmacists; IRB, institutional review board; MUE, medication use evaluation; PBRN, practice-based research network; PGY1, postgraduate year 1; PGY2, postgraduate year 2; PPA, Pediatric Pharmacy Association; PRRP, pediatric resident research project; RPD, residency program director; TPB, theory of planned behavior

KEYWORDS pharmacy residency; practice-based research networks; research projects; theory of planned behavior

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Introduction

The American Society of Health-System Pharmacists (ASHP) requires that postgraduate year 1 (PGY1) and postgraduate year 2 (PGY2) residents participate in research or quality improvement projects.^{1,2} Several challenges exist in conducting pediatric pharmacy research, including small sample size, applicability to patient care, lack of sufficient resources/time, duplicate projects, varying preceptor research experience, and difficulty in manuscript acceptance by peer-reviewed journals.^{3,4} In a review of projects presented at the Pediatric Pharmacy Association (PPA) Bruce Parks Memorial Residency Showcase between 2006 and 2015, Miller et al⁴ noted

that only 17.1% of projects were published. It is likely that one of the reasons for the low publication rates for residency projects is the fact that most are conducted at a single center and use a limited sample size. A remedy to this may be collaboration between residency programs to address these concerns and to allow the project to have stronger external validity and greater sample size.

Stultz et al³ conducted a survey of the PPA membership to explore the willingness of its members to participate in multicenter, practice-based research networks (PBRN) for the purpose of increasing research efforts in pediatric pharmacotherapy; they noted that 63% of survey respondents were interested in participating in a PBRN. Given this information, it seems prudent that

one avenue of increasing research efforts would be through collaboration of pharmacy resident projects. Unfortunately, there are insufficient data detailing how pharmacy personnel feel about multicenter pharmacy research. Therefore, the purpose of this study was to explore pharmacy resident, preceptor, and residency program director (RPD) intentions toward participation in a multicenter pediatric resident research project (PRRP).

Methods

This was an institutional review board (IRB)–approved, prospective, exploratory study of pediatric pharmacy preceptors, RPDs, and residents from May 1, 2019, and June 15, 2019. Eligible participants had to be licensed pharmacists with a primary practice in a pediatric subspecialty at an institution with a PGY1 pharmacy or PGY2 pediatric pharmacy residency program. These participants were identified via a list of active residency programs through the PPA. Pharmacists with a primary practice site in pediatrics that were not part of a pharmacy residency program were excluded from participation. Informed consent was obtained prior to study participation.

Recruitment and Focus Group Construction. A recruitment letter was emailed to eligible participants. The email explained the purpose of the research, criteria of participation, confidentiality specifications, and that participants were free to participate or withdraw at any time. Upon return receipt of the research invitation, a follow-up email was sent to thank the participants for their interest in participation in the study and to provide the date, time, and location of their focus group session.

This study used the theory of planned behavior (TPB) as the framework with which to gather information about pharmacists' beliefs regarding participation in a multicenter PRRP. The TPB has been used in the pharmacy literature^{5,6} to assess and predict the behavioral intention of pharmacists' beliefs. As part of TPB, behavioral intention comprises 3 components, including attitude toward the behavior, or *salient beliefs* (i.e., a person's positive or negative salient thoughts or beliefs about the outcome of a behavior); *subjective norms* regarding the behavior (i.e., relates to the positive or negative normative beliefs about how other peers or people of importance [e.g., supervisor, dean] would want them to behave); and *perceived behavioral control* (refers to the perceptions of ease [positive] or difficulty [negative] of their ability to perform or control the behavior of interest). Focus groups were used because their open-ended nature provides opportunities for fluid discussion and rich descriptions of experiences and beliefs. Participants were organized into 2 focus groups: 1) pharmacists whose roles were RPDs or preceptors, and 2) pharmacists who were PGY1 pharmacy or PGY2 pediatric pharmacy residents. This was done to ensure that focus groups had representation from each type of pharmacist working on resident research

projects and to alleviate fear of sharing beliefs while in the presence of superiors.

Each focus group was conducted over a 60-minute period and included a moderator and a notetaker. The RPD and preceptor–focused group occurred in person during the 2019 PPA Annual Meeting. However, because of scheduling conflicts, the 60-minute focus group with PGY1 and PGY2 pediatric residents occurred via a phone conference call in June 2019. The moderator (PJ) explained the study's purposes, the role of the moderator, the role of the notetaker (JM), the use of digital audio recorders, and confidentiality. Participants were asked to complete a 15 to 21-item digital demographic survey before the session (Supplemental Table S1). A semi-structured discussion guide was used during the focus group sessions to assist in keeping on topic (Supplemental Tables S2 and S3). The demographic survey and discussion guide were developed and approved by the research team for content validity and application of the TPB. The first 3 discussion guide items helped to collect pharmacists' general opinions about multicenter PRRPs. The remaining discussion guide items gathered their attitudes (i.e., advantages and disadvantages), subjective norms, (i.e., others who encourage or discourage), and perceived behavioral control (i.e., things that make it easier or difficult) beliefs regarding implementing multicenter PRRPs. Participants were offered an opportunity to express any other thoughts or opinions related to multicenter PRRPs and to provide any additional thoughts they might have after the focus groups concluded.

Study Objectives and Data Analysis. The primary objective was to identify attitudes or salient beliefs, subjective norms, and perceived behavioral control regarding participation in multicenter PRRPs. The secondary objectives included identifying potential barriers to multicenter PRRPs and strategies to mitigate these barriers. Descriptive statistics were used to summarize data from the demographic survey of participants. Following completion of the focus group, handwritten notes and audio recordings were compiled to produce a transcript. Analysis and coding were conducted by 2 analysts (BS and BW) who created a codebook of nodes. During this process, the analysts considered several factors: the frequency with which comments were mentioned, specificity of detail, level of emotion, and extensiveness of something said by participants. The analysts determined and compiled themes based on relationships within the agreed codebook nodes among all focus group sessions. All nodes, themes, and subthemes (if found) were compared, revised, and edited until analysts agreed on data saturation. These themes and subthemes were then discussed and approved by the entire research team.

Table 1. Residency Project Mentor Demographics, Research and Scholarship Experiences, and Perceptions of Residency Projects from Their Programs (n = 16)

Variable	Result
Clinical and research/scholarship experiences of residency project mentors	
Role, n (%)	
Preceptor	9 (56.3)
Residency preceptor director	7 (43.7)
Total number of residents in residency program, mean $\pm$ SD	
PGY1	3.3 $\pm$ 2.0
PGY2 (n = 9)	1.2 $\pm$ 0.44
Years of clinical experience, mean $\pm$ SD	13.9 $\pm$ 9.1
Years of research experience, mean $\pm$ SD	7.4 $\pm$ 5.4
Research and scholarship are required for position, yes, n (%)	5 (31.3)
Number of peer-reviewed manuscripts (n = 11 out of 16), mean $\pm$ SD	5.5 $\pm$ 5.1
Percentage of residency projects you have published, n (%)	
0–10	8 (50)
11–24	3 (18.8)
25–49	1 (6.3)
50–74	2 (12.5)
75–100	2 (12.5)
Number of residency projects for which you served as primary mentor, mean $\pm$ SD	3.9 $\pm$ 3.2
Participation in multicenter research, n (%)	
Involving pharmacy residents	2 (12.5)
Not involving pharmacy residents	5 (31.3)
None	9 (56.3)
Perception of residency projects	
Is a research committee formed for the research project? Yes, n (%)	9 (56.3)
Process of research project delineation, n (%)	
Selected by resident	14 (87.5)
Assigned to resident	2 (12.5)
Is publication of the residency project required? Yes, n (%)	6 (37.5)
Resources offered by residency site, n (%)	
Biostatistician	7 (43.8)
Writing center	2 (12.5)
Library	9 (56.3)
Database access to peer-reviewed journals	14 (87.5)
Types of resident research conducted, n (%)	
MUE	12 (75)
Retrospective review	16 (100)
Quality improvement	12 (75)

PGY1, postgraduate year 1; PGY2, postgraduate year 2

Results

Sixteen preceptor/RPDs (preceptors, n = 9 [56.3%] and RPDs, n = 7 [43.7%]) were included in the research project mentor focus group. Table 1 presents their demographics. The mean years of clinical experience for the research project mentors was 13.9 $\pm$ 9.1 years. Five (31.3%) noted that research and scholarship was a

required element of their position. Eleven (68.8%) had published ≥ 1 peer-reviewed manuscript; the mean number of publications was 5.5 $\pm$ 5.1. The mean number of residency projects for which the preceptors and RPDs had served as the primary mentor was 3.9 $\pm$ 3.2. The majority (n = 11; 68.8%) had only published between 0% and 24% of residency projects. Seven (43.7%) had participated in a multicenter research project, only 2

Table 2. Resident Demographics, Research and Scholarship Experiences, and Perceptions of Residency Projects from Their Programs (n = 8)

Variable	Result
Resident demographics and previous experience with research/scholarship	
Role, n (%)	
PGY1 pharmacy	3 (37.5)
PGY2 pediatric pharmacy	5 (62.5)
Did you participate in an IRB research project as student? Yes, n (%)	8 (100)
Role in IRB project as student, n (%)	
Data collection	8 (100)
Analysis	6 (75)
Writing protocol	4 (50)
Presenting	6 (75)
If you are PGY2, what type of research project did you complete as a PGY1? (n = 5 PGY2s), n (%)	
MUE	5 (100)
Retrospective	5 (100)
Quality improvement	4 (80)
If you are PGY2, was your PGY1 manuscript submitted for peer-reviewed publication? n (%)	
No	3 (60.0)
Yes	2 (40.0)
Perception of residency projects	
Did your residency program develop a research committee for you to use? Yes, n (%)	4 (50)
Resources offered by residency site, n (%)	
Biostatistician	4 (50)
Writing center	0
Library	4 (50)
Database access to peer-reviewed journals	6 (75)
No resources provided	1 (12.5)
Projects assigned versus selected, n (%)	
Assigned	1 (12.5)
Selected	7 (87.5)

IRB, institutional review board; PGY1, postgraduate year 1; PGY2, postgraduate year 2

(12.5%) of which involved a residency research project.

The RPDs and preceptor participants were asked several questions regarding the type of projects and resources offered to complete residency research projects (Table 2). The preceptors and RPDs noted that resident projects included MUEs, quality improvement projects, and retrospective studies. The majority (87.5%) noted that their residents selected their projects, as opposed to projects being assigned. Nine (56.3%) research project mentors noted that their programs offered resources including a biostatistician (43.8%), writing center (12.5%), library (56.3%), and database to access peer-reviewed journals (87.0%).

Eight subjects participated in the resident focus group, which included 3 (37.5%) PGY1 pharmacy and 5 (62.5%) PGY2 pediatric pharmacy residents (Table 2). All of these residents were from programs in which their RPD or preceptors did not participate in the other focus group. Four of the residents trained at the same

program as another participant (i.e., 2 PGY1s from the same program and 2 PGY2s from the same program). All residents had participated in an IRB-approved research project as a student, and most of these trainees had the opportunity to collect and analyze data and present the findings of their research as a student. For the PGY2 pediatric pharmacy residents, all of them completed a residency research project that was classified as a retrospective MUE or quality improvement project. Two of the 5 PGY2 pediatric pharmacy residents had submitted their PGY1 research project to a peer-reviewed journal at the time of completion of the questionnaire.

Several questions were asked regarding the PGY1 pharmacy and PGY2 pediatric pharmacy residents' experience with their current research projects. Seven (87.5%) stated that their current research project was assigned to them. Half (50%) of the residents noted that their program incorporated a research committee

Table 3. Belief Themes Identified Per Theory of Planned Behavior Constructed According to Experience and Current Position

RPDs and Preceptors		PGY1 and PGY2 Pharmacy Residents	
Attitude (salient beliefs)*			
<u>Positive salient beliefs</u> <ul style="list-style-type: none"> • Publishing • Resident skill set • Networking 	<u>Negative salient beliefs</u> <ul style="list-style-type: none"> • Communication • ASHP requirements • Logistical challenges • Time • Manuscript authorship concerns 	<u>Positive salient beliefs</u> <ul style="list-style-type: none"> • Sample size • Networking • Mentorship • Resources • Diversity of research mentors' skill sets 	<u>Negative salient beliefs</u> <ul style="list-style-type: none"> • Logistical challenges • Time • Manuscript authorship concerns • Loss of experience
Subjective norms†			
<u>Positive normative beliefs</u> <ul style="list-style-type: none"> • Marketability of the residents and the residency programs • Collaboration of investigators • Pharmacy directors and administrators' value on multicenter PRRPs 	<u>Negative normative beliefs</u> <ul style="list-style-type: none"> • Additional workload by taking on a multicenter PRRP • Communication • Liability concerns about data management • Coordination between sites 	<u>Positive normative beliefs</u> <ul style="list-style-type: none"> • Collaboration of investigators • Valuable experience for skill development for residents 	<u>Negative normative beliefs</u> <ul style="list-style-type: none"> • Lack of ownership of multicenter PRRPs • Additional workload by taking on a multicenter PRRPs • Stress of taking on a multicenter PRRP
Perceived behavioral control‡			
<u>Positive control beliefs</u> <ul style="list-style-type: none"> • Data collection management tools • Development of IRB application • Conflict resolution between residents and investigators 	<u>Negative control beliefs</u> <ul style="list-style-type: none"> • Delegation of responsibilities • Resources • Accountability between investigators • Time 	<u>Positive control beliefs</u> <ul style="list-style-type: none"> • Data collection management tools • Development of IRB application • Feedback from co-investigators 	<u>Negative control beliefs</u> <ul style="list-style-type: none"> • Complexity of deadlines • Dedicated research time • Loss of control

ASHP, American Society of Health-System Pharmacists; IRB, institutional review board; PGY1, postgraduate year 1; PGY2, postgraduate year 2; PRRP, pediatric resident research project; RPD, residency program director

* A person's positive or negative salient thoughts or beliefs about the outcome of a behavior

† This relates to the positive or negative normative beliefs about how other peers or people of importance (e.g., supervisor, dean) would want them to behave.

‡ This refers to the ease (positive) or difficulty (negative) perceptions of their ability to perform or control the behavior of interest

to mentor them on their project. There was a range in responses as far as resources offered by their research site, with those including a biostatistician ($n = 4$; 50%), a library ($n = 4$; 50%), and database access to peer-reviewed journals ($n = 6$; 75%). One resident (12.5%) noted that his site did not offer any specific resource to guide residents on their research projects.

Attitudes (Salient Beliefs). Table 3 provides an overview of the positive and negative *salient beliefs* of RPDs, preceptors, and residents about participating in multicenter PRRPs. Among the positive salient beliefs, both groups identified that multicenter PRRPs could help residents by providing them with opportunities to enhance their research skills sets and allowing them networking opportunities with investigators from other institutions. Residents noted that multicenter PRRPs would allow them access to resources (e.g., biostatistical support) and mentorship with more experienced researchers than may be unavailable at their site. In

addition, the residents and RPDs/preceptors noted the possibility of having an increased sample size because a multicenter project may have a greater potential of publication.

Several negative salient beliefs were identified by both groups, including concerns about how to decide authorship order, writing roles on the manuscript with the additional residents and research mentors on each project, and the logistical challenges and time needed to coordinate and execute a multicenter project. The RPDs/preceptors also noted a few other negative salient beliefs, including the challenge of maintaining adequate communication among the residents, research mentors, and other members of the research team between the different sites. They also noted that it might be difficult to ensure that each resident would successfully complete the ASHP-required elements of their research projects, including obtaining IRB approval, completing their required platform presentation,

and preparation of their manuscripts. The residents also noted that use of a multicenter PRRP might result in the loss of some experiences, as residents would have to share some aspects of the research process, including protocol development, division of responsibilities in writing abstracts and manuscripts, and sharing roles during platform presentations.

Subjective Norms. Several positive and negative subjective norms were identified regarding the RPD, preceptor, and resident beliefs about how their peers and superiors would view their residents participating in multicenter PRRPs (Table 3). The RPDs/preceptors and residents identified that their peers and superiors would view that multicenter PRRPs would help facilitate collaborations between investigators to conduct research that might not have been feasible without multiple sites, either because of small sample size or the expertise of a specific investigator. Both groups felt that professional organizations like the PPA would benefit from these collaborations in terms of increasing the quality of practice-based research and engaging other members to participate as contributing sites or as research mentors. Residents felt that others might view the unique opportunities of a multicenter project as an activity to help advance their research skill sets. This was similar to a theme identified by RPDs/preceptors, who felt that these multicenter PRRPs would allow their residents to be more marketable for positions following completion of these projects. In addition, they felt that offering these multicenter projects would help with marketability of their programs to interested residents. Both RPDs and preceptors noted that pharmacy directors and administrators would also value the notoriety that their residents and employees would gain through the presentations and publications that these PRRPs could help to achieve.

Several negative subjective norms were also noted in both groups. Both RPDs/preceptors and residents mentioned that many would view that implementation of multicenter projects would increase the workload of residents, preceptors, and RPDs, given the additional time and effort needed to participate. This was also echoed by additional feedback from residents, who felt that residents who participated in these projects might encounter additional stress from the increased workload. The RPDs/preceptors stated that many would view the potential complications with communication between sites as a hindrance to participation in multicenter projects. In addition, the resident group noted that participating residents might feel a lack of ownership for the project because they may have to share some responsibilities with IRB protocol development, data collection, and data analysis. The RPDs/preceptors also identified some additional liability concerns with multicenter PRRPs in that some administrators and IRBs might have concerns about questions regarding data ownership. They also identified that the ASHP Commis-

sion on Credentialing might have concerns about how these projects may affect their residency accreditation status, with their residents sharing responsibilities and roles on presentations and manuscripts.

Perceived Behavioral Control. The RPDs/preceptors and residents were asked additional questions regarding perceived behavioral control, things that make participation with multicenter PRRPs easier (positive) or more difficult (negative). Both groups felt that data collection management tools such as Research Electronic Data Capture (REDCap; Vanderbilt University, Nashville, TN) would be needed to allow residents to submit their data to a centralized site that uses a standard format. They also mentioned that working on a centralized template for IRB applications would help facilitate completion of this requirement in a timely manner. The RPDs/preceptors also felt that having additional research mentors and preceptors involved might help to address conflict resolution among the different residents participating in the multicenter PRRP.

Both groups noted several negative control beliefs. Both RPDs/preceptors and residents noted that time was a factor beyond the control of participants. This included the time needed for protocol development and data collection. However, the residents noted that there might be variability among programs in terms of whether they offer dedicated research time. Among the participating residents, the variability in the dedicated research time in their residency programs ranged as follows: from 1 research day per month to 1 to 2 research days per rotation to 2 weeks of research (including the ASHP Midyear Clinical Meeting), to several research days in December plus a full month rotation, to a full month rotation with 1 project day per month for the last 6 months of the residency. The residents felt that if they had a difference in dedicated research time, then their timeline for data collection and analyses would affect the progression of the project. Residents voiced concern that participation in multicenter projects would result in loss of control over their project and would introduce additional complexities regarding how to meet the different research guidelines implemented by ASHP requirements and individual program requirements. The RPDs/preceptors noted that having multicenter projects may result in a lack of accountability among participating residents and their research mentors and that as a result there would be difficulty in ensuring appropriate delegation of activities. They also noted that various sites might have difficulty in finding resources to facilitate completion of larger multicenter projects, such as the presence of biostatisticians and technology to facilitate conference calls and other sensitive meetings.

Additional Items for Discussion. Attendees were asked additional questions for discussion. Each group was asked questions about how they felt that investigators would determine authorship order on manuscripts submitted for publication. Several RPDs/preceptors and

residents commented that their sites do not require manuscripts to be submitted for publication. There were no specific recommendations provided on how to navigate the manuscript preparation and publication process. However, many commented during both focus groups that the author order should be discussed ahead of time. Each group was also asked for open comments regarding multicenter PRRPs. A few RPDs/preceptors noted that at their sites only physicians can serve as the primary investigator on a research project, so residents and research mentors from these facilities would need to include physicians from these sites in order to meet IRB requirements. One RPD noted that it might be helpful to have a physician champion on each project to provide additional perspective, depending upon the selected journal for submission. A few RPDs/preceptors noted that if their residents were to participate, collaboration with organizations such as the PPA would be needed to work out logistics to ensure that each participating resident was given time to present a portion of the project. In addition, they noted that these multicenter projects could be an elective research project for residents who wanted additional experience with research so that they would be able to conduct their own projects. Alternatively, the residents discussed that if they started the research project during their PGY1 pharmacy residency and completed their PGY2 pediatric pharmacy residency at the same site that they could continue with their data collection and analysis, which would allow them more time to overcome the logistical challenges of the multicenter PRRP.

Discussion

To our knowledge, this is the first study to evaluate RPD, preceptor, and pharmacy resident intentions to participate in multicenter PRRPs. Overall, participants identified many benefits of multicenter PRRPs. These thoughts were captured using the TPB to identify their beliefs in order to predict their behavioral intention, which included the following: their attitude (positive/negative salient beliefs), subjective norms (positive/negative normative beliefs about what their peers or superiors think about the behavior), and perceived behavioral control (things that make their beliefs easier [positive] or more difficult [negative] toward residents and programs participating in multicenter PRRPs). If a person has a positive attitude about a behavior that can be easily performed and is favorable in the view of those surrounding the person, the likelihood of that person participating in the behavior will be high.^{5,7} Based on our focus groups, the residents', preceptors', and RPDs' intention to participate in multicenter PRRPs is very likely if they perceive this as an opportunity for increased networking and mentorship, increased likelihood of publication, enhanced research skill experience, and shared resources and responsibilities.

A focus group model using the TPB as the framework

of the semi-structured discussion guide was selected for the conduct of this research. There is a paucity of data in the literature regarding the perspectives and intentions of participants in multicenter PRRPs. As a result, we felt that a survey of resident, preceptor, and RPD beliefs and intentions would not be adequate because the questions asked might be biased toward the investigator teams' beliefs and would not capture the full scope of the respondents' beliefs and intentions toward participating in multicenter PRRPs. The TPB was originated by Ajzen⁷ in 1985 and is an extension of the theory of reasoned action by Fishbein in 1967. The TPB has been cited multiple times in a wide range of areas to predict behavior, as well as in pharmacy literature for assessing the beliefs and attitudes of pharmacy personnel to participate in certain behaviors.⁵⁻⁷

Among the RPDs and preceptors who participated in the focus groups, we noted significant clinical experience and experience with residency research projects, as evidenced with a mean of 13.9 and 7.4 years' worth of experience, respectively. In addition, all resident participants had previous research experience as a student. Most (68.8%) RPDs/preceptors had published ≥ 1 manuscript, but the majority (68.8%) had published less than one-quarter of their residency projects. These data highlight that publishing residency projects is difficult even for experienced practitioners. In fact, a recent study by Miller and colleagues⁴ found that <20% of residency projects presented at the PPA Bruce Parks Memorial Research showcase over a 10-year period went on to be published, at a median of 21.4 months (interquartile range, 16.2–30.5) following residency completion. The RPDs and preceptors were not asked during the focus groups or demographic survey why they had difficulty in publishing these projects. However, previous studies⁴ have indicated several problems in publishing residency research projects, including limited sample size, inadequate research design, lack of research mentor experience, and availability of biostatistician support.

One strategy proposed to increase the successfulness of publication of pharmacy residency research projects is to conduct a multicenter project within a PBRN.⁸ Cook⁸ felt that the use of PBRN for resident projects could help increase the sample size and thus the impact of the residency project. Even though our RPD/preceptor focus groups included experienced practitioners, the majority (56.3%) had never participated in multicenter research, and among the 5 who had done so, only 2 of them had involved residents. As noted, Stultz et al³ found that 63.4% of the PPA member respondents were willing to participate in a PBRN; however, it is important to note that their survey did not assess the willingness of these members for resident participation in multicenter PRRPs. The members surveyed may not have been associated with a residency program; therefore, it is essential to gain additional perspective on resident, RPD, and preceptor interest in participation in these projects because of the

timeline of the resident research process.

Our focus group participants identified several benefits associated with participation in multicenter PRRPs, as noted in Table 3. They noted that there is variability in resources for research within each residency program, including the availability of biostatistical support, data collection tools (e.g., REDCap), a library, a database from which to access peer-reviewed journals, and a writing center to help with manuscript editing. The respondents noted that collaborating with other residency programs would facilitate sharing of pooled resources. In addition, it could also facilitate enhanced collaboration of skilled research mentors that could augment the research team by bringing expertise that research mentors at individual sites might not have. A systematic review on the effect of mentorship in academic medicine by Sambunjak et al⁹ noted that research mentors influence research productivity and overall research opportunities. So it is plausible that having more experienced research mentors on each project, in addition to increased sample size and a more rigorous research design, may increase the likelihood of study publication. The respondents also noted that multicenter research projects would help with networking of the residents and research mentors. They felt that organizations like the PPA would benefit from these collaborations. In addition, they felt that these collaborations would enhance the caliber of their programs to interested students and the marketability of the participating residents, given the additional research experiences that they would gain.

Despite the many positive benefits, the focus group participants also identified several challenges to multicenter PRRPs. One of the most mentioned challenges was the added complexity of the logistical challenges of working on a larger project with more investigators from different residency programs. Each residency program may have a slightly different research timeline than others, and as noted from the resident participants, there is variability in terms of the amount of dedicated research time that residents are given to complete their projects. Shafeeq et al¹⁰ conducted a survey of recent PGY2 critical care pharmacy residents and compared responses between those who did and did not publish their research projects; they found that among those who published their research projects that they were given dedicated research time during their PGY2 for data collection and writing ($p < 0.05$). The participants noted that there might be additional research involvement time required for residents and their mentors to ensure adequate communication with the other participating sites. As a result, the resident participants noted that this might cause increased stress among residents, who will need to juggle this task with their other clinical and teaching responsibilities. The RPDs/preceptors mentioned that there might be some liability concerns about ownership of data that may have to be worked through with each institution's IRB to ensure compliance

with their site policies and procedures. Lastly, resident participants did express that some of the participating residents may experience loss of control over some aspects of the research process as a result of sharing roles and responsibilities with other participating residents. Both RPDs/preceptors and residents also discussed that an additional challenge is deciding the authorship order, given the number of additional participants that would be involved. It is difficult to compare our findings with those of other studies, because we are unaware of any previous research that has examined challenges associated with residents participating in multicenter research or PBRNs.

There were some limitations to this research. First, we used focus groups to explore underlying beliefs of participants, so the actual intent of their willingness to participate in the multicenter PRRPs was not determined. Second, because this was a sample of RPDs, preceptors, and residents from various pediatric pharmacy programs, it may not be reflective of the beliefs and intentions of members of other residency programs. The RPD/preceptor focus groups had several years of clinical and research experience, and the residents all had research experiences as students. Their research experiences could have affected their responses, and different themes could have been identified if participants had less previous research experience. Conversely, it may have been more beneficial to include those with more research experience, because they may be able to identify the challenges and benefits in a broader fashion. Third, it was difficult to determine the quality of research experiences of the RPDs/preceptors, so it is possible that although these participants had been involved in residency research projects that this experience may not have provided strong mentorship and guidance for the residents. This may explain the limited number of publications that this group had involving their completed residency research projects. Fourth, it is possible that during the focus groups the investigator team may have introduced some bias based on the questions that were asked. However, we attempted to negate this concern by using a scripted discussion guide to help ensure consistency of language and focus.

Based on the findings of this research and our experience with a recently published multicenter PRRP, we suggest several recommendations that RPDs, preceptors, and organizations like the PPA should consider concerning resident participation in multicenter projects.¹¹ First, research mentors need to work with RPDs to identify potential research projects well in advance of the start of the residency academic year. In addition, they should explore the feasibility of conducting the project and gauge the level of interest with investigators from other sites. For example, we recently published¹¹ a multicenter PRRP with colleagues from another academic children's hospital. The primary research mentor identified the project in January and identified potential sites

in April, prior to the start of the residency year. As part of these discussions, the research mentors and RPDs from both programs were able to explore the feasibility of the project and to identify logistical barriers before the project was selected by the incoming residents. Second, research mentors and RPDs should be aware of the different timelines (e.g., IRB and residency oversight committee submission, platform presentation deadlines) and dedicated research time that programs have in place. For our recent project, the participating residents had different timelines for presenting the project to their residency oversight committee and submitting their IRB protocol and different deadlines for their practice platform presentations. In addition, the residents had different amounts of dedicated research time; one program allowed a full research month, while the other program offered some availability in December but did not provide dedicated research time. In order to address this, we laid out the timelines from each program as a group and went with the more stringent timelines at the beginning of the project. In addition, we delineated tasks for the residents and research mentors to help facilitate the disparities in dedicated research time. Third, we suggest that programs identify the potential resources needed to complete the project and work with potential sites to pool resources. With our project, one site had a dedicated biostatistician and audio/video conferencing that we were able to use for the project, whereas the other site had a secure platform for document sharing in real time to allow for comments from the research mentors and RPDs. The recent pandemic has forced many practitioners to use virtual meeting platforms. As a result, many practitioners are more comfortable at navigating the virtual environment, and these virtual meeting platforms may expand opportunities to collaborate with other sites to a greater extent. Fourth, we suggest discussing author order for manuscripts and presentations at the beginning of the project. This was discussed at one of the earliest meetings of the research group and helped to alleviate concerns throughout the completion of the project. Fifth, we also discussed the research platform presentation at the PPA Bruce Parks Memorial Residency Showcase and the need for each resident to have an opportunity to present to fulfill the ASHP-required learning objectives. To address this issue, we reached out to the PPA director and the PPA Research Chair to ensure that our residents could present back to back on different aspects of the research project.

In order to facilitate future multicenter PRRPs, we believe that organizations like the PPA are essential. As noted above, the participants believe that one of the benefits of multicenter PRRPs is networking in professional organizations and expansion of research opportunities. As was noted by Stultz and colleagues³, it appears that members of the PPA are interested in further development of PBRNs, and these PBRNs could be a way to facilitate multicenter PRRPs. The PBRN may

provide a way for research mentors to identify other investigators at other pharmacy residency programs with similar interests in pursuing research in a specific area. In addition, the PPA could consider adapting the schedule for the Bruce Parks Memorial Residency Showcase to accommodate residents participating in multicenter PRRPs and to allow time for both residents to present some aspects of their project.

Conclusion

This was the first study to explore preceptor, RPD, and resident beliefs and intentions in participating in multicenter PRRPs. The RPDs/preceptors and resident participants had previous research experience. Several themes overlapped in the 2 focus groups regarding attitudes, subjective norms, and perceived behavioral control. The resident, preceptor, and RPD intention to participate in multicenter PRRPs is very likely if they perceive this as an opportunity for increased networking and mentorship, increased likelihood of publication, enhanced research skill experience, and shared resources and responsibilities. Multicenter PRRPs could be a means by which to increase sample size and the impact of residency research projects.

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