***Pharmacy Education*** (2026) 26(1) 230 - 246
https://doi.org/10.46542/pe.2026.261.230246

RESEARCH ARTICLE

# Exploring elements of success in international collaboration in pharmacy academia: A survey-based study

Caroline W. Sasser[1,2], Nina A. Inayan[1], Sarah D. Merritt[1]

[1] Eshelman School of Pharmacy, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, United States
[2] Faculty of Pharmacy and Pharmaceutical Sciences, Monash University, Melbourne, Australia

**Keywords**
International cooperation
Organisational barrier
Pharmaceutical sciences
Pharmacy education

**Correspondence**
Caroline W. Sasser
UNC Eshelman School of Pharmacy
Chapel Hill
North Carolina
United States
*caroline_sasser@unc.edu*

## Abstract

**Background:** International collaboration is growing in pharmacy academia. As international collaboration takes considerable resources, it is important to understand how to best support and measure success for these activities. The purpose of this research is to identify motivations, individual and team-based metrics of success, as well as contributors and barriers to success for international collaborations in academic pharmacy. **Methods:** A cross-sectional online survey with closed- and open-ended questions was developed and piloted by the research team. Convenience and snowball sampling recruited pharmacy school students, faculty, and staff involved in international collaboration. Quantitative data were analysed using descriptive statistics, while qualitative data underwent thematic analysis with both inductive and deductive coding. **Results:** A total of 54 survey responses were analysed. The main motivations for international collaboration were gaining global perspectives, fostering relationships with researchers, and enhancing research quality. Notable differences were found among groups by gender, seniority, and work focus. A total of 27 codes emerged from qualitative data, categorised into metrics of success (e.g., publications), contributors (team dynamics and individual traits), and barriers (logistical issues, lack of funding, and commitment). **Conclusion:** Successful international collaborations in pharmacy rely on strong infrastructure, clear team structures, and recognition of individual motivations and contributions. With proper institutional support, communication, and motivation, these collaborations can drive innovation, productivity, and long-term impact.

## Introduction

International collaboration has been increasingly important within many fields, including medicine and pharmaceutical sciences, yielding higher impact research and providing resources and professional growth opportunities for collaborators (Katz & Martin, 1997; Schmoch & Schubert, 2008; Ribeiro *et al.,* 2018; Abebe, 2020; AL-Aqeel *et al.,* 2020; Bond *et al.,* 2021). In academia, international collaboration can provide similar benefits but can also foster diverse perspectives and enhance work satisfaction (Arakawa & Anderson, 2020; Dusdal & Powell, 2021; Prescott *et al.,* 2023). Despite these benefits, it is still a relatively untapped resource, with modest growth among bibliometric studies (Kim, 2006; Fonseca *et al.,* 2016; Abdill *et al.,* 2020).

International collaboration is growing within pharmacy education. Globalisation has been recognised as a major initiative by the American Association of Colleges of Pharmacy (AACP) and the International Pharmaceutical Federation (FIP) (American Association of Colleges of Pharmacy, 2024; International Pharmaceutical Federation (FIP), 2019). Pharmacy schools have continued to offer global opportunities to students through international partnerships and experiential education (Steeb *et al.,* 2016, 2019). This is inclusive of graduate education as well, through organisations like Globalisation of Pharmaceutics

Education Network (GPEN) (Globalisation of Pharmaceutics Education Network (GPEN), n.d.). As international collaboration becomes more common, it is important for international teams to understand how to work together effectively to increase chances of success.

Many elements of collaboration have been studied among team types, including general Tschannen-Moran, 2000; Salas *et al.,* 2018), academic (Stephens & Cummings, 2021; Sbaity *et al.,* 2023), cross-sectoral (Evans & Austin, 2010; Puebla Fortier & Coulter, 2021), and interprofessional teams (D'Amour *et al.,* 2005; Howey & Yoon, 2022; Wei *et al.,* 2022). Team success is impacted by goals, support, team dynamics, sharing practices, communication, and coordination. Interpersonal factors like trust, patience, respect, interest in collaborative problem solving, and psychological safety have also been identified as important for team success (Henneman *et al.,* 1995; Tschannen-Moran, 2000; D'Amour *et al.,* 2005; Evans & Austin, 2010; Salas *et al.,* 2018; Puebla Fortier & Coulter, 2021; Howey & Yoon, 2022; Wei *et al.,* 2022; Sbaity *et al.,* 2023). While some work has also been done to describe cross-cultural and international collaboration, this area of teamwork or collaboration is relatively underexplored, especially in academic settings.

Known challenges to international collaboration can arise from goal or expectation misalignment, language barriers, time zones, differences in cultural beliefs and practices, different regulatory environments, availability of international funding, differing approaches to research, and individual personalities (Liu *et al.,* 2019; Dusdal & Powell, 2021; Pinho & Reeves, 2021; Prescott *et al.,* 2023). Despite the additional or heightened barriers that come with international collaboration, it can pay dividends to those that choose to engage. Previously identified motivations and benefits include broadening comparative knowledge, enhanced access to third-party funding, and friendship (Dusdal & Powell, 2021).

International, collaborative pharmacy academic activities, including those in research and education, likely have unique barriers and enabling facilitators. Prescott et al (2023) described key factors that influence international partnerships including personal connections, understanding of each other's programs and systems, mutual benefits that may not be identical, and collaborative qualities like open-mindedness, adaptability, global citizenship, and cultural/structural awareness (Prescott *et al.,* 2023). Additional influencing factors may include differing shipping regulations and data protection laws, differences in educational structures and scopes of practice, and mismatches between organisational culture and resources. When it comes to measuring outcomes of international collaborations, aside from expert opinion, there is little research that investigates metrics of success for international collaborations in pharmacy academia.

Given these unique challenges and potential payoff, it is important for pharmacy academics and their institutions to understand how to support and measure international collaboration. Several examples of established international collaborations in academic pharmacy exist, such as PharmAlliance, the Purdue-Kenya Program, Pharmabridge, NeuroGEN, and GPEN, but little literature exists describing factors that influence engagement or team success (FIP Foundation for Education and Research, n.d.; Globalisation of Pharmaceutics Education Network (GPEN), n.d.; PharmAlliance, n.d.; Ilomäki *et al.,* 2020). By exploring these concepts with established international teams within academic pharmacy, we can generate data from experienced perspectives. Further, broad identification of barriers and facilitators can aid institutions and partnerships as they strive to support international teams in research and education. Therefore, this research aims to understand motivations, metrics of success, contributors to success (i.e., facilitators) and barriers to success for international collaborations in academic pharmacy.

## Methods

### *Survey design*

A cross-sectional online survey (Qualtrics, Provo, UT) was designed to investigate individual and team-based metrics of success, along with facilitators and barriers to success, for international collaborators in academic pharmacy. The survey method was chosen over other qualitative methods like focus groups or interviews to reach a larger group of participants and incorporate more diverse perspectives. At the time of survey design, no published survey instruments were available to meet the research's aims, therefore, the survey was developed by the research team, reviewed by a local educational research review committee, and piloted with research team members for clarity and time to complete prior to launch. The research team members who piloted the survey are involved in active international collaborations and work in a global office supporting international activities at the University of North Carolina at Chapel Hill Eshelman School of Pharmacy. The survey was designed to take no more than 15 minutes to complete (Revilla & Höhne, 2020). The survey included both closed- and open-ended

questions. Demographics were assessed by seven open- and closed-ended survey items including participant names, titles, institutional affiliations, gender, age, racial and/or ethnic identity, and workload estimates for job duties. An additional nine open- and closed-ended questions assessed motivators for involvement in international collaboration, the nature of the participant's active international collaborations, metrics of success for themselves and their collaborations, as well as barriers and facilitators to success for those collaborations. Motivator choices were adapted from existing literature (Guthrie *et al.,* 2017). The survey can be found in Appendix A.

The survey collected identifiers so researchers could confirm international collaborative activity before including in data analysis and reduce risk of multiple entries by one participant. The survey was open from January 24, 2023, until March 16, 2023. Two reminder emails were sent within the study period. This research was unfunded, and no incentives were offered. Informed consent was collected at the start of the online survey and was recorded with the response. The study was approved as exempt through the Institutional Review Board at the University of North Carolina at Chapel Hill (IRB #22-1405).

***Participants and recruitment***

Participants consisted of students, faculty, and staff associated with a school of pharmacy who were actively engaging in international collaborations. The initial cohort of participants was identified through convenience sampling, and the survey was sent to the researchers' network of local and international academic collaborators engaging in international research or teaching collaborations. Participants were eligible for inclusion if they documented at least one international research or education project in their question nine survey response that could be verified by researchers through online documentation of presentations, publications, or teaching activities. To be considered "*international*", there must have been collaborators from at least two countries involved in the collaboration. Snowball sampling was then utilised to expand the participant pool (Johnson, 2014). For this reason, sample size and survey response rate were unable to be calculated.

***Data handling and analysis***

Raw survey data were stored in Qualtrics, which was only accessible on the University's virtual private network using University single sign-on and requiring dual authentication. Raw data were only available to researchers. Survey data were de-identified prior to storage on secure network drives and analysis.

Missing data was dealt with through listwise deletion, whereby participants with unanswered questions, including question 9, were omitted from data analysis; only responses that were 100% complete were included in this study. This was done because our data analysis strategy required context for appropriate interpretation. Open-ended responses of "*none*" were included in data analysis with the interpretation that these participants do not consider team-based or individual metrics of success in their international collaborations.

Demographic data and closed-ended questions were analysed using descriptive statistics in Excel (Microsoft Corporation, 2019). Open ended survey questions were analysed in MAXQDA 2022 (VERBI Software, 2021) using content and thematic analysis through a combination of inductive and deductive coding. An initial codebook was created from previously published literature, which investigated motivations, benefits, and challenges to international collaboration (Arakawa & Anderson, 2020; Dusdal & Powell, 2021). Three researchers participated in the coding process (one student coder and two global office staff coders). Initial codes were assigned independently to all data by a primary coder (student coder) and independently by a secondary coder (one of the staff coders). The student coder therefore coded all data initially; the staff coders each coded half of the data, initially. The initial codes were discussed by all three coders together to create a modified codebook. A second round of coding was then completed, utilising the modified codebook, whereby a primary coder (student coder) and secondary coder (one of the staff coders) independently re-coded all the data. The student coder therefore re-coded all data; the staff coders each re-coded half of the data however they re-coded the half of the data they did not initially code. Discrepancies were discussed amongst the research team until there was 100% code agreement after the re-code stage. There were no disagreements after discussion. Codes were then condensed utilising a constant comparison method. Data saturation was reached as no new codes emerged from survey responses during the coding process (Saunders *et al.,* 2018). An audit trail was recorded in the coding software. Triangulation was not done as there was only one source of data, however findings were verified by both staff coders who had experience in the subject area.

***Research team members***

Throughout survey design, analysis, and interpretation, researchers were intentional about reflexivity. The research team was comprised of one woman fourth-year pharmacy student who identifies as Asian American and two women staff members of the

University of North Carolina at Chapel Hill Eshelman School of Pharmacy who identify as European Americans and support strategic global initiatives in pharmacy education, partnership development, and international student exchanges.

## Results

A total of 83 responses were collected; however, 29 responses were excluded for the following reasons: one, no consent given; two, identity unable to be verified; one, duplicate response; 13, no data recorded after consent provided; one, only demographic data provided; 11, missing qualitative data. No responses were excluded based on researcher screen to confirm international collaboration activity. A total of 54 responses were included in data analysis. As above, response rate was unable to be calculated. Participant demographics can be found in Table I, which were felt to be largely representative of the sample population.

**Table I: Demographics of students, faculty and staff participants**

| Demographic information (n = 54) | | Number | Percentage |
|---|---|---|---|
| **Genders** | Man | 23 | 42.6% |
| | Woman | 28 | 51.9% |
| | Cisgender | 1 | 1.9% |
| | Transgender | 1 | 1.9% |
| | I prefer not to respond | 1 | 1.9% |
| **Age** | 25-29 years old | 3 | 5.6% |
| | 30-39 years old | 11 | 20.4% |
| | 40-49 years old | 18 | 33.3% |
| | 50 or more years old | 22 | 40.7% |
| **Ethnicity/Race** | White and/or European | 40 | 74.1% |
| | Black and/or African | 6 | 11.1% |
| | Asian | 5 | 9.3% |
| | Latinx, Hispanic, and/or Spanish Origin | 1 | 1.9% |
| | Other | 1 | 1.9% |
| | I prefer not to respond | 1 | 1.9% |
| **Country** | United States | 26 | 48.1% |
| | Australia | 17 | 31.5% |
| | England | 5 | 9.3% |
| | Malawi | 1 | 1.9% |
| | Finland | 1 | 1.9% |
| | Croatia | 1 | 1.9% |
| | Namibia | 1 | 1.9% |
| | Spain | 1 | 1.9% |
| | Egypt | 1 | 1.9% |
| **Seniority**[†] | Senior | 22 | 40.1% |
| | Mid-level | 18 | 33.3% |
| | Junior | 6 | 11.1% |
| | Staff | 4 | 7.4% |
| | Student | 3 | 5.6% |
| | Unknown | 1 | 1.9% |
| **Average time spent on the following activities each week (20% = 8-hour workday)**[††] | Research | | 27.3% |
| | Administrative responsibilities | | 18.9% |
| | Educational activities (e.g., attending class, teaching/lecturing, marking, preparing materials) | | 18.7% |
| | Professional engagement (e.g., leadership or committee roles) | | 16.1% |
| | Advising learners (e.g., post-docs, student researchers, precepting, mentoring) | | 15.6% |
| | Patient care, clinical activities | | 10.3% |
| | Other commitments or responsibilities | | 8.3% |

[†]Junior academic includes roles of assistant professor, lecturer, level A-C academic, clinical pharmacist, adjunct faculty; Mid-level academic includes roles of associate professor, senior lecturer/reader, level D academic; Senior academic includes roles of professor, level E academic, Dean, Director of Pharmacy academic

[††]Time allocation separated by academic, clinical, or professional responsibilities or commitments on a weekly basis.

***Quantitative data: motivators for international collaboration***

The most common motivators for participating in international collaborations included to "*Gain new perspectives and new opportunities globally*," "*Desire to work with, or maintain/build a relationship with researchers globally*," "*Improve quality of research*," "*Continue current global relationship," and "to access expertise*," with more than 50% of participants selecting these as motivations for international collaboration. Complete data can be found in Table II.

**Table II: Motivation for international collaboration**

| Which factors influenced your choice to be involved in international collaboration? | Total, number (%) | Women, number (%†) | Senior faculty, number (%†) | Research >20%, number (%†) | Teaching >20%, number (%†) |
|---|---|---|---|---|---|
| Gain new perspectives and new opportunities globally | 45 (83.3) | 27 (60.0) | 19 (42.2) | 22 (48.9) | 21 (46.7) |
| Desire to work with, or maintain/build a relationship with researchers globally | 42 (77.8) | 22 (52.4) | 18 (42.9) | 24 (57.1) | 19 (45.2) |
| Improve quality of research | 36 (66.7) | 18 (50.0) | 18 (50.0) | 21 (58.3) | 17 (47.2) |
| Continue current global relationship | 35 (64.8) | 19 (54.3) | 14 (40.0) | 14 (40.0) | 14 (40.0) |
| To access expertise | 29 (53.7) | 13 (44.8) | 14 (48.3) | 15 (51.7) | 12 (41.4) |
| To provide support/mentorship to a junior researcher who is part of the collaboration | 18 (33.3) | 12 (66.7) | 11 (61.1) | 14 (77.8) | 6 (33.3) |
| Help build research capacity in another country | 18 (33.3) | 12 (66.7) | 9 (50.0) | 11 (61.1) | 8 (44.4) |
| Professional status and/or to be recognised as a respected member of the community | 16 (29.6) | 7 (43.8) | 6 (37.5) | 10 (62.5) | 9 (56.3) |
| Access to funding/financial reasons | 15 (27.8) | 8 (53.3) | 8 (53.3) | 8 (53.3) | 5 (33.3) |
| Notoriety of schools | 8 (14.8) | 5 (62.5) | 5 (62.5) | 4 (50.0) | 5 (62.5) |
| To seek support/mentorship from a senior researcher | 5 (9.3) | 5 (100.0) | 0 (0.0) | 2 (40.0) | 5 (100.0) |
| Seeking access to facilities or equipment | 2 (3.7) | 2 (100.0) | 2 (100.0) | 2 (100.0) | 0 (0.0) |
| Preferable work schedule | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |

†Within question responses, e.g., 50% of respondents that selected "*improve quality of research*" identified as women

Women represented roughly half of the study population but tended to find mentoring a more important motivator than their counterparts. No men respondents selected "*seek support/mentorship from a senior researcher" as a motivator and only one-third of participants that selected "provide support/mentorship to a junior researcher who is part of the collaboration*" were men. Additionally, women made up two-thirds of respondents who selected "*help build research capacity in another country*." These results are descriptions of frequency and were not compared statistically.

Like women respondents, a greater proportion of senior faculty selected "*provide support/mentorship to a junior researcher...*" compared to their non-senior counterparts. Similarly, senior faculty selected "*notoriety of schools*," and "*access to funding/financial reasons*" as important motivators more often than their non-senior faculty peers. These results are descriptions of frequency and were not compared statistically.

Notably, nearly all respondents that selected "*to seek support/mentorship from a senior researcher*" were from outside of the United States. Responses from research- and teaching-focused participants (> 20% of week spent on the activity) also showed potential between-group differences. Research-focused participants made up about half of the study population but tended to prioritise providing mentorship and de-prioritise seeking mentorship as motivational factors compared to their counterparts. It was found that nearly 60% of research-focused participants were senior faculty at their academic institutions. Teaching-focused participants represented roughly 40% of the total study population, but more often selected motivations of "*professional status and/or be recognised as a respected member of the community*," "*notoriety of schools*," and "*to seek support/mentorship from a senior researcher*" compared to their counterparts. These results are descriptions of frequency and were not compared statistically.

***Qualitative data: metrics, contributors and barriers of success in international collaborations***

A total of 27 final codes were identified from the qualitative data. Results were organised by open-ended questions: Metrics of success, contributors to success, and barriers of success in international collaboration. The final codebook, along with definitions and representative quotes are available in Tables 3.1, 3.2, and 3.3.

***Metrics of success***

Participants most often discussed publications, scientific presentations, and grants or other sources of revenue when asked how they measured success in international collaboration. This was consistent across both team-based and individual metrics of success. Participants noted that these metrics were critical in demonstrating the impact and outcomes of their research, building their professional reputations, and attracting funding opportunities in the future. These metrics were typically tangible outputs produced by the collaborators that could be easily quantified. Additional examples included spin off companies, patents, licenses, new methodologies, new discoveries, educational products, and student exchanges.

In contrast to the above, intangible outputs such as increased knowledge and development of new skills were also identified as an important marker of success for both teams and individuals. Individual metrics of success often included broadening their own knowledge or networks, and team-based metrics more often emphasised impacting scientific communities, including future generations of scientists. Other intangible outcomes that indicated success included team dynamics, team operation, and satisfaction. Participants emphasised general metrics of efficiency, communication, and meeting timelines and expectations. They also highlighted friendship and positive interactions, personal satisfaction, and continued or future collaborations with the same group as a metric of success. Example quotes include "*getting to know one another's likes and dislikes (e.g. cat vs. dog; coffee vs. tea)*," "*whether you feel a sense of belonging while working together*," and "*a sense of pride from all collaborators in the final product*." Definitions and representative quotes for each code can be found in Table III.A.

**Table III.A: Codes, definitions and quotes on individual and team-based metrics of success**

| Code | Definition | Example |
|---|---|---|
| Team Dynamics | Collaborators refer to certain behaviours or characteristics that members of their teams | "*Engagement is important to allow us to reach educational and practice objectives faster and ensures that we don't go down the wrong path for too long*" |
| Continued/future collaborations | Collaborators refer to maintaining current international teams and gain further connections to work with in the future | "*Desire to work with collaborators in the future*" |
| No difference between individual and team-based success | Collaborators refer to not distinguishing between individual and team-based metrics of success when collaborating internationally | "*Same as above*" |
| No difference between international and domestic collaborations | Collaborators refer to having the same metrics of success for international collaborators as for domestic collaborations | "*Same metrics as I would with any domestic collaborations*" |
| Opportunity cost | Collaborators refer to whether their work in the collaboration was worth their time | "*My 'feelings' about the experience, whether I find it valuable, whether I could use my time for other things*" |
| Broaden knowledge and expertise | Collaborators refer to increasing the depth of one's knowledge via networks, impact on more communities, or of themselves | "*This can be demonstrated when we meet individually with a person because they have been given us great feedback and engagement. We would use that person to give us a greater understanding of practice/issues, formulate an implementation and take that back to the wider group*" |
| Do not consider individual metrics of success | Collaborator refers to only considering team-based metrics of success when collaborating internationally | "*We need to do better with this*" |
| "*None*" | Collaborators refer to considering neither individual nor team-based metrics of success | "*None*" |
| Other outputs | Collaborators refer to tangible products or new ideas/discoveries | "*A resulting product (e.g., manuscript, dissemination meeting)*" |
| Facilitates recognition | Collaborators refer to noticeable or public appreciation of their work by others | "*Having someone be referred to me because they know about/seen my work*" |
| Feedback | Collaborators refer to receiving comments, suggestions, and criticisms from their team | "*Evaluation from participants*" |

| Code | Definition | Example |
|---|---|---|
| Satisfaction, pride | Collaborators refer to having a sense of fulfilment that comes from their work with others towards a shared goal | "*Feeling good about my contribution to the work of the team*" |
| Meeting team deadlines and expectations | Collaborators refer to the ability to deliver their work, tasks, or assignments within the specified timeframe and quality that was agreed upon by their team | "*Ability to achieve mutually set goals (in delivery of new globally delivered education initiatives*" |
| Dissemination of knowledge | Collaborators refer to the process of sharing information, ideas, and products to a broader audience, specifically through publication and scientific presentations | "*Research products (papers, abstracts*" |

Notably, twelve participants indicated that they either did not differentiate between team- and individual-based metrics of success, or they did not consider individual metrics of success. One participant acknowledged the lack of differentiation and said "*N/A - we need to do better with this*."

***Contributors to success***

When asked about contributors to success in international teams, participants most often identified team dynamics and individual characteristics. Team dynamics included shared goals and values, friendship, positive interactions, adaptability, regular communication, periodic in-person interactions, and effective organisation. One participant stated that "*[having] the same common goals for the work [and] shared responsibilities*" contributed to success in international collaboration. Clarity in responsibilities, roles, and timelines were important aspects to effective organisation. When discussing shared goals and values along with adaptability, one participant explained that a contributor to success is "*Regular update meetings to keep the project(s) focused on the overall goals and to adjust the approach as needed*." Team dynamics were influenced by relationships amongst the team. One participant demonstrated this by saying, "*One of the critical success factors when working for international teams is building strong relationships with your colleagues...*" Finally, the team concept of "*fluidity*" came up with relative frequency, meaning a healthy collaboration allows collaborators to come in and move out depending on the project without negative consequences. Other important themes that emerged included shared responsibility, respect, and following ethical global health collaboration principles.

On an individual level, traits such as commitment, open-mindedness, and perseverance were seen as valuable assets for achieving success. In the case of resilience/perseverance, participants most often discussed the importance of commitment to the collaboration despite a lack of funding or time during their day job. Definitions and representative quotes for each code can be found in Table III.B.

**Table III.B: Codes, definitions and quotes on contributors to success**

| Code | Definition | Example |
|---|---|---|
| Individual characteristics | Collaborators refer to certain behaviours or characteristics that members of their teams exhibited which contributed to success | "*Willingness of partners to contribute meaningfully*" |
| Effective organization | Collaborators refer to the team's ability to reach their goals successfully | "*A strong project leader/manager to hold others accountable*" |
| Topic potential | Collaborators refer to the ability to build off additional projects | "*Starting with a small project and building from that*" |
| Support | Collaborators refer to support from trainees, institutions and leaders, as well as funding and resources | "*Institutional support from school/faculty administrators (e.g., Deans & Chairs)*" |
| Team dynamics | Collaborators refer to certain behaviours or characteristics that member of their teams have that contribute to their success | "*Having the mentality 'Better to be a champion team than a team of champions*" |
| Effective communication | Collaborators refer to active listening, regularity, honesty/clarity, technology support, in-person interactions, and timely outreach as strategies which contribute to success | "*We need to do better with this*" |

***Limitations to success***

Interestingly, external support was rarely mentioned in questions about contributors to success, however lack of support was a common theme in responses about barriers to success. Participants focused on lack of institutional support like leadership buy-in and grants

office knowledge of international funding opportunities. Additionally, themes related to regulatory and logistical challenges, particularly regarding shipping and import controls, were prominent. Furthermore, differences in work and academic environments surfaced as significant themes, encompassing variations in work culture, intense local pressures at home sites, and discrepancies in academic calendars and holidays.

In this context, participants frequently underscored the logistical challenge posed by differing time zones and noted a common issue of commitment. One participant, for instance, mentioned the barrier of "*not respecting different time zones when scheduling meetings*." Moreover, another participant emphasised the importance of commitment, stating that team members failed to update the group when their circumstances changed, thus preventing the fulfilment of previously agreed-upon actions, which presented a significant hindrance to success.

Aligned with themes of effective communication and team dynamics as contributors to success, participants noted that ineffective communication and poor team dynamics could be an obstacle to international collaborations. Poor communication was often attributed to difficulties with time zones, which made it challenging to communicate effectively. Team dynamic issues included differing goals and values like conflicting priorities or mismatched expectations that limited the group's success. Imbalance of power was also mentioned frequently.

Finally, individual characteristics like lack of commitment, engagement, and respect were identified as barriers to success in international collaborations. Participants noted pessimism and strong personalities could cause imbalance and limit success. Definitions and representative quotes for each code can be found in Table III.C.

**Table III.C: Codes, definitions and quotes on barriers to success**

| Code | Definition | Example |
|---|---|---|
| Individual characteristics | Collaborators refer to certain behaviours or characteristics that members of their teams that limit success | "*The lack of follow through. Nonadherence to previously established statements of work and/or the timeliness of those tasks*" |
| Stress levels (e.g., individual, workload, team dynamic) | Collaborators refer to stress levels as a factor limiting success | "*Excessive workload for individual partners that detract from input*" |
| Differences in work/academic environment | Collaborators refer to differences in terms of work culture, schedules, etc. when working with individuals from different institutions as a limitation to their success | "*Lack of understanding of the context they or I work in*" |
| Limited or not support | Collaborators refer to inadequate support in terms of funding/resources, institutional, and junior collaborators | "*Additional regulations regarding government funding to overseas institutions. Grants offices of international institutions are not as familiar with NIH funding protocols and formats. Sharing of physical samples requires navigation of international shipping and customs procedures.*" |
| COVID (pandemic) | Collaborators refer to the difficulties working through the pandemic in relation to limiting their success. | "*Shifting priorities (pandemic)*" |
| Poor team dynamics | Collaborators refer to certain behaviours or characteristics that members of their teams have that limit their success | "*The team just doesn't work, both parties are not equally invested in the progress*." |
| Ineffective communication | Collaborators refer to lack of in-person interactions, lack of clarity, lack of communication, irregularity, language barriers, and different time zones as limitations to success. | "*Team members not updating the team when their circumstances have changed (in a way that means they're not able to follow through on previously agreed actions) limits success*." |
| No difference between international and domestic collaborations | Collaborators refer to having the same metrics of success (individual and team-based) for international collaborations as for domestic collaborations | "*The same thing that affects domestic collaborators*" |
| "*None*" | Collaborators refer to not considering barriers to success when collaborating internationally | "*None*" |
| Ineffective organization | Collaborators refer to the team's ability to be able to reach their goals impeding their success. | "*They do not want to work together because it may affect them professionally*" |
| Different goals and values | Collaborators refer to differing objectives and priorities than individuals bring into their collaboration | "*Not all participants see the international team effect as a priority, creating a mismatch between expectations and real output*" |

## Discussion

Engaging in international collaboration in pharmacy academia comes with benefits and implications for both individuals and institutions. Our findings support much of what was already known in existing literature surrounding general and international collaboration, however some new findings emerged. Regarding motivations, our general findings aligned with existing literature, however nuances found between subgroups, such as differing emphases on mentorship, have not been explored extensively to our knowledge. Facilitators and barriers identified also supported previously published research although new themes emerged that may be more specific to pharmacy academia. These themes included differences in work culture and academic calendars, regulatory and shipping logistical challenges, ethical global health collaboration principles, team member engagement and perseverance, time zone accommodation, and personal attributes like pessimism and "*strong personalities*". Finally, metrics of success identified in this paper support what academics and universities traditionally value such as publications and grants, as well as previously described benefits of international collaboration including work satisfaction, increased resources, and professional development.

By leveraging insights into the underlying motivations for international collaboration, institutions can strategically design partnerships that effectively address institutional gaps and promote individual engagement. This may be particularly helpful when considering differences in motivation by gender, academic rank, and teaching- vs. research-focused roles. Partnerships can be designed to offer mentoring programs specifically to teaching-focused, junior, or women faculty members (Kanter, 2010; Rumbley & Altbach, 2016; Ubaka *et al.,* 2017). A focus on research capacity building within the partnership or collaboration may interest women faculty, in particular. Engagement in the partnership may benefit if senior faculty are supported to apply for international grant opportunities while mentoring more junior faculty in the process. This mentoring process through grant writing may be particularly beneficial to collaborators at newer universities or those with access to fewer resources.

Despite a general interest in impact from participants, this study found that the notoriety of institutions or schools may not be as important to researchers and academics when pursuing international collaborations. Instead, collaborators may be more motivated by the diverse perspectives and expertise offered by international counterparts, which could be amplified by variance in institutional prestige. Regardless of the prestige of the partnering university, institutions can still boost their global presence through international collaboration and positively impact rankings that consider criteria like sustainability, employment outcomes, and international research networks (QS TopUniversities, n.d.).

As universities invest in international collaborations, employee satisfaction is also likely to be affected. As mentioned above, this research emphasises the humanistic side of collaboration as a crucial aspect to consider, even as a metric of success (Crowe *et al.,* 2020). Our research also highlights the desire to build global relationships as a motivation, which has been explored as a key factor that drives international collaborations in pharmacy (Crowe *et al.,* 2020; Prescott *et al.,* 2023). While individuals can network through international conferences or professional organizations, institutions can help facilitate this process for their faculty members. Creating resources such as a searchable collaborator or mentor database or planning structured lightning round networking presentations with partner institutions can streamline the process of connecting individuals with shared goals, research interests, and complementary skillsets. By engaging in global work, individuals can derive personal fulfilment and job satisfaction through their exposure to novel experiences, positive interactions, and encounters with diverse cultures and perspectives. The satisfaction derived from successful collaborations likely motivates teams to work together in the future, despite the additional effort international collaboration requires, and can promote a positive collaborative culture within the academic community beyond one's immediate work environment and relationships.

As additional time and resources are often required for international collaborations compared to domestic collaborations, teams should be carefully designed and supported to optimise return on individual and institutional investment. A comprehensive understanding of collaborator strengths serves to enhance the effectiveness of teams by leveraging these strengths. Teams may also proactively identify collaborators with complementary strengths, expertise, and mindsets to increase effectiveness. This study corroborates previous findings that highlight the importance of team and individual attributes such as engagement, friendship and positive interactions, openness, communication, and shared goals and values (Henneman *et al.,* 1995; Tschannen-Moran, 2000; D'Amour *et al.,* 2005; Evans & Austin, 2010; Salas *et al.,* 2018; Schruijer, 2020; Puebla Fortier & Coulter, 2021; Howey & Yoon, 2022; Wei *et al.,* 2022; Prescott *et al.,* 2023; Sbaity *et al.,* 2023). Though technology can make some of these barriers easier to manage, previous research has shown that physical proximity matters; as

physical distance among collaborators increases, knowledge impact of collaborative work decreases (Stephens & Cummings, 2021). Collaborators should therefore consider investing in the latest project management software (e.g., Monday.com, ClickUp, Trello, Asana) and approaches (e.g., Agile, Waterfall), which can facilitate coordination and communication among international collaborators (Fair, 2012; Haan *et al.,* n.d.).

This research supports previous findings that international teams must be adaptable and understanding to work together to effectively meet shared goals (Matthews *et al.,* 2020). Identifying potential barriers of success early in the collaboration, such as language barriers or regulatory differences, can help collaborators set realistic expectations, identify support or resources required, and ultimately overcome these challenges. Examples of common barriers in international collaboration are differences in time zones, resources, and engagement levels. Collaborators may need to adjust their schedules and work outside of regular hours to accommodate their colleagues in different time zones. Imbalance in resources like funding or time available for research should be addressed within teams. Collaborators should be forthcoming about their own limitations around after-hours work and competing priorities which can affect their ability to engage. Anticipating and addressing engagement disparities can allow teams to avoid progress delays and feelings of unfairness among team members. Managing interpersonal dynamics, including conflict resolution, effective communication, and cultural sensitivity training may be crucial for successful international collaborations.

Institutions also have responsibility in ensuring the health of international collaborations. Having an institutional framework for international collaboration can lower the threshold for faculty to initiate and engage in international collaboration. Institutions should provide training, resources, and policies to facilitate cross-border partnerships, fostering a culture of openness and cooperation (Crump *et al.,* 2010; Cisneros *et al.,* 2013). Institutions can also support collaboration through seed funding, facilitation of networking events or grant writing, and supporting travel for face-to-face interactions. Institutions should also consider promoting unique metrics of success for faculty involved in international collaboration. Aligning metrics of success with institutional strategic priorities, faculty promotion policies, and collaborative goals is crucial for optimizing return from the collaboration and encouraging faculty engagement. Aside from traditional metrics like publications, metrics like improved educational materials and student exchanges can be rewarded to recognise important outputs from international teams. An interesting concept that emerged from this research was a lack of delineation between team and individual metrics of success. It may be that deep, successful collaborations have perfect or near-perfect alignment in individual and team goals. Alternatively, international collaborations may be attractive to participants that prioritise team success over individual success. Regardless of the 'why' or the 'what,' it is important to determine metrics of success that benefit the institution, team, and individuals a priori to use time and resources most effectively in international collaboration.

Some limitations of the study include the use of snowball sampling which may have introduced sampling and self-selection bias, resulting in a non-diverse participant pool. Researchers included all participants that documented a history of international collaboration which could be verified online by researchers; however, responses were not stratified by level of experience, which may have influenced the results and interpretations of this study. Additionally, exclusion of partially complete survey responses may have introduced nonresponse or attrition bias. Furthermore, the overrepresentation of white/European, senior, and mid-level career participants restricts the generalisability of the findings and potentially introduces cultural and generational biases. Additionally, the study did not assess participants' definitions of international collaboration, which may vary widely. The small sample size and exploratory approach limit the interpretation of results and between-group differences, necessitating further research to confirm and expand these insights. The findings may be more applicable to Western institutions and may not be as generalizable as these practices can differ from country to country. Moving forward, future research should explore motivations among academics in low-middle-income countries, women, minorities, and junior faculty, while continuing to evaluate international collaborations in pharmacy practice and among student pharmacists. Due to the inability to clarify survey responses, including focus groups would be beneficial to provide deeper insight into best practices and motivations for diverse populations engaging in international collaborations.

## Conclusion

Supporting international collaborations requires a well-designed infrastructure, effective team dynamics, and recognition of individual commitment. Institutions should provide adequate financial, technological, and

logistical support to encourage successful international collaborations. International collaboration in pharmacy can fuel innovation, productivity, and advancement. Strategic investments in these collaborations benefit individuals and institutions. Therefore, team members should be selected carefully, and their roles and responsibilities should be clearly defined with regular communication and feedback mechanisms. Additionally, recognising and rewarding the effort and commitment of international collaborators is crucial for sustaining motivation and ensuring success. By addressing these aspects, institutions can effectively support international collaborations and reap the benefits of increased networking, innovation, and impact in research and other fields.

## Conflict of interest

The authors declare no conflict of interest.

## Acknowledgement

The authors would like to thank the PharmAlliance partnership, from whose network many participants were recruited.

## Ethics approval

The study was approved through the Institutional Review Board at the University of North Carolina at Chapel Hill (IRB #22-1405).

## Informed consent

Informed consent was collected at the beginning of the online survey.

## Source of funding

The authors did not receive any funding.

## References

Abdill, R. J., Adamowicz, E. M., & Blekhman, R. (2020). International authorship and collaboration across bioRxiv preprints. ELife, **9**. https://doi.org/10.7554/eLife.58496

Abebe, E. (2020). Positioning global pharmacy research partnerships to advance health equity. *Research in Social and Administrative Pharmacy*, **16**(11), 1619–1621. https://doi.org/10.1016/j.sapharm.2020.08.019

AL-Aqeel, S., Mendes, A. M., Taisir, H., & Fernandez-Llimos, F. (2020). International collaboration in pharmacy practice research: A bibliometric analysis. *Research in Social and Administrative Pharmacy*, **16**(11), 1513–1518. https://doi.org/10.1016/j.sapharm.2020.05.019

American Association of Colleges of Pharmacy. (2024). *2024-2026 Strategic Plan: Empowering the pharmacy academy and pharmacists to impact the health care landscape*. https://www.aacp.org/sites/default/files/2024-09/StrategicPlan-2024-2026.pdf

Arakawa, N., & Anderson, C. (2020). Challenges and opportunities in conducting health services research through international collaborations: A review of personal experiences. *Research in Social and Administrative Pharmacy*, **16**(11), 1609–1613. https://doi.org/10.1016/j.sapharm.2020.06.011

Bond, M., Marín, V. I., & Bedenlier, S. (2021). International collaboration in the field of educational research: A Delphi study. *Journal of New Approaches in Educational Research*, **10**(2), 190–213. https://doi.org/10.7821/naer.2021.7.614

Cisneros, R. M., Jawaid, S. P., Kendall, D. A., McPherson, C. E., Mu, K., Weston, G. S., & Roberts, K. B. (2013). International practice experiences in pharmacy education. *American Journal of Pharmaceutical Education*, **77**(9), 188. https://doi.org/10.5688/ajpe779188

Crowe, S. J., Karwa, R., Schellhase, E. M., Miller, M. L., Abrons, J. P., Alsharif, N. Z., Andrade, C., Cope, R. J., Dornblaser, E. K., Hachey, D., Holm, M. R., Jonkman, L., Lukas, S., Malhotra, J. V., Njuguna, B., Pekny, C. R., Prescott, G. M., Ryan, M., Steeb, D. R., & Tran, D. N. (2020). American College of Clinical Pharmacy Global Health Practice and Research Network's opinion paper: Pillars for global health engagement and key engagement strategies for pharmacists. *JACCP: Journal of the American College of Clinical Pharmacy*, **3**(6), 1097–1112. https://doi.org/10.1002/jac5.1232

Crump, J. A., Sugarman, J., & __. (2010). Ethics and best practice guidelines for training experiences in global health. *The American Society of Tropical Medicine and Hygiene*, 83(6), 1178–1182. https://doi.org/10.4269/ajtmh.2010.10-0527

D'Amour, D., Ferrada-Videla, M., San Martin Rodriguez, L., & Beaulieu, M.-D. (2005). The conceptual basis for interprofessional collaboration: Core concepts and theoretical frameworks. *Journal of Interprofessional Care*, **19**(sup1), 116–131. https://doi.org/10.1080/13561820500082529

Dusdal, J., & Powell, J. J. W. (2021). Benefits, motivations, and challenges of international collaborative research: A

sociology of science case study. *Science and Public Policy,* **48**(2), 235–245. https://doi.org/10.1093/scipol/scab010

Evans, G., & Austin, F. (2010). Collaborations among academia, government, and industry in the diagnostics space: Barriers and some ideas for solutions*. Science Translational Medicine*, **2**(63). https://doi.org/10.1126/scitranslmed.3001633

Fair, J. (2012). Agile versus Waterfall: Approach is right for my ERP project? Paper presented at PMI® Global Congress 2012—EMEA, Marsailles, France. Newtown Square, PA: Project Management Institute. https://www.pmi.org/learning/library/agile-versus-waterfall-approach-erp-project-6300

FIP Foundation for Education and Research. (n.d.). *Pharmabridge: Our work*. Retrieved August 22, 2024, from https://www.fipfoundation.org/pharmabridge/

Fonseca, B. de P. F. e, Sampaio, R. B., Fonseca, M. V. de A., & Zicker, F. (2016). Co-authorship network analysis in health research: Method and potential use. *Health Research Policy and Systems*, **14**(1), 34. https://doi.org/10.1186/s12961-016-0104-5

Globalisation of Pharmaceutics Education Network (GPEN). (n.d.). *About GPEN*. Retrieved August 22, 2024, from https://gpenconference.com/about

Guthrie, S., Lichten, C., Harte, E., Parks, S., & Wooding, S. (2017). *International mobility of researchers: A survey of researchers in the UK*. https://royalsociety.org/-/media/policy/projects/international-mobility/researcher-mobility-report-survey-academics-uk.pdf

Haan, K., Smith, A. N., & Holznienkemper, L. (n.d.). *20 Best Free Project Management Software Of 2024*. Forbes Advisor. Retrieved August 22, 2024, from https://www.forbes.com/advisor/business/software/free-project-management-software/

Henneman, E. A., Lee, J. L., & Cohen, J. I. (1995). Collaboration: A concept analysis. *Journal of Advanced Nursing*, **21**(1), 103–109. https://doi.org/10.1046/j.1365-2648.1995.21010103.x

Howey, M. L., & Yoon, M. N. (2022). Insights in interprofessional education: Dental hygiene students' suggestions for collaboration. *Canadian Journal of Dental Hygiene: CJDH = Journal Canadien de l'hygiene Dentaire*: *JCHD*, **56**(1), 9–21. https://pmc.ncbi.nlm.nih.gov/articles/PMC8937569/

Ilomäki, J., Bell, J. S., Chan, A. Y. L., Tolppanen, A.-M., Luo, H., Wei, L., Lai, E. C.-C., Shin, J.-Y., De Paoli, G., Pajouheshnia, R., Ho, F. K., Reynolds, L., Lau, K. K., Crystal, S., Lau, W. C. Y., Man, K. K. C., Brauer, R., Chan, E. W., Shen, C.-Y., … Wong, I. C. K. (2020). Application of healthcare 'Big Data' in CNS drug research: The example of the neurological and mental health Global Epidemiology Network (NeuroGEN). *CNS Drugs*, **34**(9), 897–913. https://doi.org/10.1007/s40263-020-00742-4

International Pharmaceutical Federation (FIP). (2019). *Global pharmacy: Transforming outcomes through collaboration: Annual report*.

Johnson, T. P. (2014). Snowball Sampling: Introduction. In *Wiley StatsRef: Statistics Reference Online*. Wiley. https://doi.org/10.1002/9781118445112.stat05720

Kanter, S. L. (2010). International collaborations between medical schools: What are the benefits and risks? *Academic Medicine*, **85**(10), 1547–1548. https://doi.org/10.1097/ACM.0b013e3181f818ab

Katz, J. S., & Martin, B. R. (1997). What is research collaboration? *Research Policy*, **26**(1), 1–18. https://doi.org/10.1016/S0048-7333(96)00917-1

Kim, K.-W. (2006). Measuring international research collaboration of peripheral countries: Taking the context into consideration. *Scientometrics*, **66**(2), 231–240. https://doi.org/10.1007/s11192-006-0017-0

Liu, Chelsea, Shao, S., Liu, Chang, Bennett, G. G., Prvu Bettger, J., & Yan, L. L. (2019). Academia-industry digital health collaborations: A cross-cultural analysis of barriers and facilitators. *Digital Health*, **5**, 2055207619878627. https://doi.org/10.1177/2055207619878627

Matthews, K. R. W., Yang, E., Lewis, S. W., Vaidyanathan, B. R., & Gorman, M. (2020). International scientific collaborative activities and barriers to them in eight societies. *Accountability in Research*, **27**(8), 477–495. https://doi.org/10.1080/08989621.2020.1774373

PharmAlliance. (n.d*.). Partnering for better healthcare worldwide*. Retrieved August 22, 2024, from www.PharmAlliance.org

Pinho, D. L. M., & Reeves, S. (2021). An interprofessional international research collaboration: exploration of key opportunities and challenges. *Journal of Interprofessional Care*, **35**(1), 140–144. https://doi.org/10.1080/13561820.2020.1711716

Prescott, G. M., Jonkman, L., Crutchley, R. D., Dey, S., Hong, L. T., Malhotra, J., Seo, S.-W., Kawaguchi-Suzuki, M., Truong, H.-A., Unni, E., Tsuchihashi, K., Forkan, N., & Abrons, J. P. (2023). Characteristics of successful international pharmacy partnerships. *Pharmacy*, **11**(1), 7. https://doi.org/10.3390/pharmacy11010007

Puebla Fortier, J., & Coulter, A. (2021). Creative cross-sectoral collaboration: a conceptual framework of factors influencing partnerships for arts, health and wellbeing. Public Health, 196, 146–149. https://doi.org/10.1016/j.puhe.2021.05.017

QS TopUniversities. (n.d.). *Understanding the methodology: QS world university rankings*. Retrieved August 22, 2024, from https://www.topuniversities.com/university-rankings-articles/world-university-rankings/understanding-methodology-qs-world-university-rankings

Revilla, M., & Höhne, J. K. (2020). How long do respondents think online surveys should be? New evidence from two online panels in Germany. *International Journal of Market Research*, **62**(5), 538–545. https://doi.org/10.1177/1470785320943049

Ribeiro, L. C., Rapini, M. S., Silva, L. A., & Albuquerque, E. M. (2018). Growth patterns of the network of international collaboration in science. *Scientometrics*, **114**(1), 159–179. https://doi.org/10.1007/s11192-017-2573-x

Rumbley, L. E., & Altbach, P. G. (2016). The local and the global in higher education internationalization. In *Global and Local Internationalization* (pp. 7–13). SensePublishers. https://doi.org/10.1007/978-94-6300-301-8_2

Salas, E., Reyes, D. L., & McDaniel, S. H. (2018). The science of teamwork: Progress, reflections, and the road ahead. *American Psychologist*, **73**(4), 593–600. https://doi.org/10.1037/amp0000334

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: exploring its conceptualization and operationalization. *Quality & Quantity*, **52**(4), 1893–1907. https://doi.org/10.1007/s11135-017-0574-8

Sbaity, E., Zahwe, M., Helou, V., Bahsoun, R., Hassan, Z., Abi Khalil, P., & Akl, E. A. (2023). Health research collaborations by academic entities: A systematic review. *Academic Medicine*, **98**(10), 1220–1227. https://doi.org/10.1097/ACM.0000000000005277

Schmoch, U., & Schubert, T. (2008). Are international co-publications an indicator for quality of scientific research? *Scientometrics*, **74**(3), 361–377. https://doi.org/10.1007/s11192-007-1818-5

Schruijer, S. (2020). The dynamics of interorganizational collaborative relationships: Introduction. *Administrative Sciences*, **10**(3), 53. https://doi.org/10.3390/admsci10030053

Steeb, D. R., Overman, R. A., Sleath, B. L., & Joyner, P. U. (2016). Global experiential and didactic education opportunities at US colleges and schools of pharmacy. *American Journal of Pharmaceutical Education*, **80**(1), 7. https://doi.org/10.5688/ajpe8017

Steeb, D. R., Urick, B. Y., Sleath, B. L., & Joyner, P. U. (2019). Institutional factors associated with global health education across US pharmacy schools. *Currents in Pharmacy Teaching and Learning*, **11**(8), 767–773. https://doi.org/10.1016/j.cptl.2019.04.004

Stephens, B., & Cummings, J. N. (2021). Knowledge creation through collaboration: The role of shared institutional affiliations and physical proximity. *Journal of the Association for Information Science and Technology*, **72**(11), 1337–1353. https://doi.org/10.1002/asi.24491

Tschannen-Moran, M. (2000). Collaboration and the need for trust. *Journal of Educational Administration*, **39**(4), 308–331. https://people.wm.edu/~mxtsch/Scholarship/JEA_CollaborationandNeedforTrust.pdf

Ubaka, C., Brechtelsbauer, E., & Goff, D. A. (2017). International mentoring programs: Leadership opportunities to enhance worldwide pharmacy practice. *Hospital Pharmacy*, **52**(7), 471–477. https://doi.org/10.1177/0018578717719375

Wei, H., Horns, P., Sears, S. F., Huang, K., Smith, C. M., & Wei, T. L. (2022). A systematic meta-review of systematic reviews about interprofessional collaboration: Facilitators, barriers, and outcomes. *Journal of Interprofessional Care*, **36**(5), 735–749. https://doi.org/10.1080/13561820.2021.1973975

**Appendix A: Survey**

**University of North Carolina at Chapel Hill**

**Research Information Sheet**

**IRB Study #:** 22-1405

**Principal Inverstigator:** Caroline Sasser

The purpose of this research study is to investigate elements of success in international collaborations. You are being asked to take part in a research study because you are a known international collaborator associated with a school of pharmacy.

Being in a research study is completely voluntary. You can choose not to be in this research study. You can also say yes now and change your mind later.

If you agree to take part in this research, you will be asked to elaborate on motivations for international collaboration, active international collaborations, as well as perceived metrics of individual success and team-based success. Your participation in this study will take about 15 minutes. There is unlimited enrollment in this study.

You can choose not to answer any question you do not wish to answer. You can also choose to stop taking the survey at any time. You must be at least 18 years old to participate. If you are younger than 18 years old, please stop now.

The possible risks to you in taking part in this research are:

In the event of breach of confidentiality, participant opinions on their international collaborators may be known, which may cause embarrassment.

To protect your identity as a research subject, all survey data will be de-identified prior to aggregation and analysis, however, the data will be stored with identifiers.

If you have any questions about this research, please contact the Investigator named at the top of this form by calling (919) 962-7399 or emailing caroline_sasser@unc.edu. If you have questions or concerns about your rights as a research subject, you may contact the UNC Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

Do you consent to participate in this study?

- I CONSENT to participate in this study and have my responses recorded.

- I DO NOT consent to participate in this study.

**Skip To: End of Survey If University of North Carolina at Chapel Hill Research Information Sheet IRB Study #: 22-1405 Princ... = I DO NOT consent to participate in this study**

**End of Block: Preamble & Consent**

**Start of Block: Demographics**

To better understand the diversity of our participants, please complete the following questions about yourself. All survey data will be de-identified prior to aggregation and analysis, however, the data will be stored with identifiers.

***First Name:***

_____

***Last Name:***

_____

***Which institution are you associated with AND what is your current position/role?***

☐ Institution _____

☐ Position/Role _____

***Which of the following best describes your gender identity?***

*Select all that apply*

☐ I prefer not to respond

☐ Cisgender

☐ Intersex

☐ Man

☐ Nonbinary, third gender, and/or gender-non-conforming

☐ Transgender

☐ Woman

☐ I prefer to self-describe _____

***What is your current age?***

☐ I prefer not to respond

☐ Less than 20 years old

☐ 20-24 years old

☐ 25-29 years old

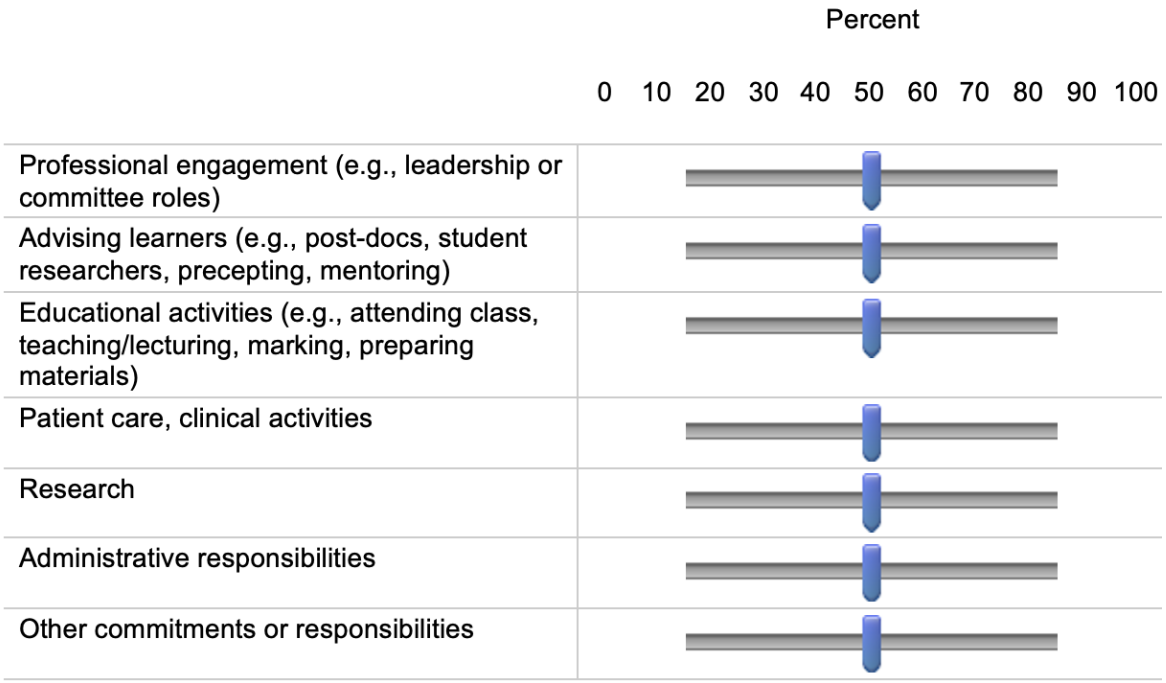
- ☐ 30-39 years old
- ☐ 40-49 years old
- ☐ 50 or more years old

***Which of the following best describes your racial and/or ethnic identity? Select all that apply***

- ☐ I prefer not to respond
- ☐ American Indian, Alaska Native, and/or Indigenous People(s)
- ☐ Asian
- ☐ Black and/or African
- ☐ Latinx, Hispanic, and/or Spanish Origin
- ☐ Native Hawaiian and/or Pacific Islander
- ☐ White and/or European
- ☐ I prefer to self-describe _____

***Please estimate the percentage of your time spent doing the following each week.***

*(Note that ~20% = an 8-hour workday)*




**End of Block: Demographics**

**Start of Block: International Collaboration**

***Which factors influenced your choice to be involved in international collaboration?***

*Select all that apply*

- ☐ Improve quality of research
- ☐ To provide support/mentorship to a junior researcher who is part of the collaboration
- ☐ Notoriety of schools
- ☐ Seeking access to facilities or equipment

- ☐ Help build research capacity in another country
- ☐ Desire to work with, or maintain/build a relationship with researchers globally
- ☐ Gain new perspectives and new opportunities globally
- ☐ Continue current global relationship
- ☐ Professional status and/or to be recognised as a respected member of the community
- ☐ Access to funding/financial reasons
- ☐ To seek support/mentorship from a senior researcher
- ☐ Preferable work schedule
- ☐ To access expertise
- ☐ Other (please specify) _____

**End of Block: International Collaboration**

**Start of Block: Block 5**

***How many international collaborations do you actively work with? Please add a colloquial name for each.***

- ☐ Collaboration 1 _____
- ☐ Collaboration 2 _____
- ☐ Collaboration 3 _____
- ☐ Collaboration 4 _____
- ☐ Collaboration 5 _____

**End of Block: Block 5**

***Start of Block: About the collaborators***

**How long have you known your collaborators in "*collaboration 1*"?**

- ☐ Less than 1 year
- ☐ 1-5 years
- ☐ 6-10 years
- ☐ 10+ years

***Do you consider your "collaboration 1" collaboration successful?***

- ☐ Yes
- ☐ No
- ☐ Maybe
- ☐ Too early to tell

**End of Block: About the collaborators**

**Start of Block: Elements of success in international collaboration**

***What metrics (objective and subjective) do you consider when evaluating team-based success resulting from your international collaborations?***

_____

_____

_____

_____

_____

***What metrics (objective and subjective) do you consider when evaluating individual success resulting from your international collaborations?***

_____

_____

_____

_____

_____

***In your experience, what factors have contributed to success when working on international teams?***

_____

_____

_____

_____

_____

***In your experience, what factors have limited success when working on international teams?***

_____

_____

_____

_____

_____

**End of Block: Elements of success in international collaboration**

**Start of Block: Known International Collaborators**

***Please provide the names and emails of any individuals who you think would be interested and eligible in participating in this research (individuals who are associated with a school of pharmacy and involved in international collaboration).***

*(Disclosure: This is optional. Your information will not be released to these individuals. There are no incentives or compensation for referrals. They will be contacted anonymously.)*

_____

_____

_____

_____

_____

**End of Block: Known International Collaborators**