



Pharmacy and physician assistant students experience benefits from an interprofessional education experience incorporating motivational interviewing training

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ABSTRACT

Background: While interprofessional education (IPE) has become commonplace, incorporation of motivational interviewing (MI) using standardized patients (SPs) has been rare, particularly use of a multi-pronged strategy of engagement among pharmacy and physician assistant students.

Objective: The aim of this study was to determine the impact of an IPE MI training intervention that employed students in teams interacting with standardized patients (SPs); specifically, the intervention impact on MI self-efficacy, professional identity formation (PIF) and attitudes toward interprofessional care.

Methods: First-year PharmD students (PGY1) and second-year physician assistant students (PA-S2) underwent a three-hour didactic class session featuring lecture and video simulations followed by an activity where teams of 6–8 students interacted with 5 different standardized patients (SPs). The educational intervention also featured a group debriefing session and written reflection prompted by answering several questions about how they fared with the SPs. Students' completed pre- and post- intervention surveys featuring standardized instrumentation measuring self-efficacy to engage in MI, professional identity formation, and attitudes toward interprofessional education.

Results: Students did not achieve substantive gains in MI self-efficacy, yet reported significant improvements in professional identity formation and attitudes toward interprofessional education. Qualitative comments from the post-intervention survey were positive for interprofessional integration and team dynamics ($n = 14$), though both PGY1 and PA-S2 students commented that academic year concordance, i.e., matching a PGY1 with a PA-S1, in future simulations could improve self-efficacy and confidence.

Conclusions: An IPE event featuring lecture, interaction with SPs, and an opportunity for mutual self-reflection on one another's roles in patient care might be beneficial to include in pharmacy and PA curriculum, even while such endeavors might be further enhanced using a longitudinal approach.

1. Introduction

Motivational Interviewing (MI) is a client-centered, evidence-based approach that uses open-ended questions to help clinicians work collaboratively with patients to better understand the patients' perspectives and reasons for change.¹ Motivational interviewing is useful in promoting positive patient health outcomes through increased likelihood of patient engagement, thereby becoming more adherent and taking greater accountability for the management of their conditions.²

Use of motivational interviewing enhances communication skills, confidence and caring attitudes of health practitioners.³ This is due at least in part through its support of patient autonomy in the decision-

making processes, with MI fostering a non-judgmental, empathic relationship with the patient, with practitioners resolving ambivalence to change through the patient's self-discovery and resolution of potentially conflicting behaviors with desired goals.² In deploying MI, the practitioner divests themselves of ego, thus serving as a guide as opposed to one providing unsolicited advice as a typical component of a more paternalistic type of approach to providing care.⁴

Practitioners are sometimes reluctant to begin engaging in use of motivational interviewing not only due to their inexperience and lack of confidence, but also in worrying that they might not be successful, thus adding to their stress and workload.⁵ Yet, evidence suggests that when using MI, health professionals tend to enjoy their jobs more and develop

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a deeper connection with patients.² While often done on a one-to-one basis, MI allows health care professionals to feel as though they are a part of a team and reinforce interprofessional disciplinary principles, which allows them to greater appreciate their own and other professions.⁶ This ultimately leads to transformational learning, which ideally amalgamates skills and knowledge of each profession and thus developing teamwork, self-awareness, belonging and camaraderie.⁴ However, overcoming personal self-efficacy issues and organizational culture and norms are barriers that must be overcome to see its implementation and the fruits from doing so.⁷

One way to promote self-efficacy in care and specifically various types of delivery such as MI is through interprofessional or team-based care. Interprofessional care has long been discussed yet really taking much more of a foothold beyond mere lip service as the benefits of such paradigms growing increasingly evident.⁸ Interprofessional healthcare is posited to promote a shared vision, creating opportunities and organizational culture supportive of continuous learning and desire for development, both individually and among a heterogeneous team of practitioners.⁹ Evidence demonstrates that when interprofessional healthcare teams engage in collaborative practice, they can enhance the delivery of person-centered care, ultimately contributing to improved patient outcomes and more effective health system performance.⁸ Reduction in medication errors and failures in communication within health care teams is associated with teamwork.³ Health care providers need to exhibit positive attitudes toward their jobs and through effective teamwork, which can be facilitated through multidisciplinary approaches like implementation of MI models.³

There is growing interest in examining the relationship between professional identity formation (PIF), well-being, and interprofessional care.¹⁰ While many definitions exist, one with common features across other definitions and which boils PIF down to its simple core is the process by which trainees/practitioners come to not only attain competence but additionally to ‘think, act and feel’ like a professional in their discipline.¹⁰ It has been suggested that PIF, in part through fostering healthier attitudes at work, translates to greater empathy given and quality of care provided to patients.¹¹ These results merit further inquiry in providing education, particularly as initial evidence suggests that participation in interprofessional practice experiences might not only enhance knowledge among student learners about other health professions but in doing so helps them internalize their own profession’s contribution to the delivery of effective care in a team environment.¹² Previous research on a course in MI promotes feelings of interprofessional collaboration among students of varying health professions.¹³

It is seldom, though, that health professions educational programs can incorporate entire courses in motivational interviewing due to crowded curriculums, the labor capital in teaching, and resources in the department or institutions to do so. Educators might consider various interventions that incorporate motivational interviewing to enhance students’ ability and promote teamwork and empathy across disciplines. It has been shown that students demonstrate their best performance in motivational interviewing during assessments using interactions with mock or standardized patients.¹² This is in spite of growing evidence on the importance of MI education in general, with its effectiveness not only important for future practitioner competence but also improving student outcomes in relation to academic achievement, behavior, and motivation, themselves.¹⁴ This is especially the case when interventions employ the use of standardized patients (SPs), as students interacting with SPs have reported self-confidence in their ability to perform skills on real patients and have also demonstrated greater interpersonal skills when interacting with patients and even colleagues and peers.¹⁵

There are relatively few published interprofessional education (IPE) activities aimed at integrating pharmacy and physician assistant students. IPE occurs when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes.¹⁶ Physician assistant students attested to having relatively little knowledge about the roles of pharmacists and

other professions, though that study was over a decade ago.¹⁷ One study saw an improvement in team-based behaviors among both PA and pharmacy students following an entire case-study course.¹⁸ As PAs practice continues to evolve with wider scope and as pharmacists become increasingly recognized as providers taking part in care teams, their likelihood of working together to tackle complex health problems of patients who require both pharmacological therapy and lifestyle modification support are inevitable. It is important to gauge whether briefer IPE interventions using tools like motivational interviewing can help promote appreciation for one another’s roles and that they can learn such practice paradigms together in hopes of collaborating on future patients’ needs for lifestyle modifications. The aim of the study is to evaluate the impact of a relatively brief interprofessional education event using motivational interviewing on students’ self-efficacy for motivational interviewing, their professional identity formation, and attitudes toward interprofessional care.

2. Methods

2.1. Course description

The course in which the intervention took place was a pharmacy administration course at Touro University California. It is the first of 4 courses in ‘pharmacy administration’ (P1 year) where students are exposed to introductory concepts in social and behavioral issues, health systems, and professional communication. The course had been employing sessions on MI for six years only for the pharmacy students enrolled in the course. The MI component consisted of a 3-h didactic lecture that featured some Youtube videos demonstrating pitfalls and best practices (examples) of various aspects of MI. This is followed by an additional course session where groups of students in their College-level pre-defined groups (students assigned to the same groups for all College courses), usually 5–8 per group depending on class size, interact with 5 different standardized patients (SPs) who play defined roles written by the course instructor (eg, a younger patient taking high doses of supplements with caffeine, a middle-aged patient who runs a food truck that may have become dependent on opioids for treatment of back pain, an elderly patient who adheres or not to various prescribed regimens as “God tells him to do”). Especially with larger groups, not every student has the opportunity to lead a discussion with an SP, but all have the opportunity to observe and then participate during “time outs” called by the discussion leader. Immediately following their interaction with the SPs is a class-wide debriefing on the experience as a whole, including discussion on which patients were “most challenging” and why, how confident they are with incorporating MI into their future practice, and others. The debriefing consisted of open discussion featuring the entire class in addition to breakouts with the students in the same grouping as who interacted with the SPs asked to reflect and discuss with one another what went well, what did not, and how they have come to better understand one another’s perspectives as health care professionals.

The course began including P2 PA students in 2022, making 2024 the third time that these students were included in the endeavor. Very little changed with incorporating these students, except for slightly larger groups, minor wording changing in scenarios/descriptions given to the students about each SP, and the debriefing session also including a bit of content on interdisciplinary collaboration and the opportunity for groups to debrief on what they learned from one another’s approaches to handling the SPs. For assessment purposes, students are not evaluated on their actual performance, but rather on reflections of their performance regarding the spirit of MI and what they did well and what they can hope to do better in future encounters. The reflection questions are based on the Motivational Interviewing Treatment Integrity (MITI) Code.¹⁹ PA students are required to assist pharmacy students in completing the reflection. Pharmacy students receive a numerical grade/score, whereas PA students receive credit or no credit for participation in one of their curriculum courses for having done so.

The objectives of the entire course for pharmacy students relate to operating effectively within the U.S. healthcare system and communicating effectively with patients. This particular exercise had objectives of describing the need for and goals of MI, discussing how MI can improve patient outcomes, and facilitating integration with other health care professionals. The course took place in the fall semester of 2024, with the above intervention occurring over the course of approximately 3 weeks in October.

2.2. Study design and measurement of constructs

Study procedures were deemed exempt from further review by the campus's Investigational Review Board. The design involved administration of a survey at the beginning of the lecture for both COP and PA students, then a second survey with similar questions at the end of the interaction with the SPs. Students signed a notice of consent during survey administration and were advised verbally by a course instructor that completing the survey was entirely voluntary and in no way had any impact on their course grade.

Motivational interviewing self-efficacy was measured using an adapted version of the Motivational Interviewing Confidence Survey (MICS pre and post participation in the course).¹³ The MICS instrument has 24 questions representing various facets of properly engaging patients in an MI encounter. In this adaptation, six items were eliminated in which either the concept was for more sophisticated/experienced learners or the terminology simply was not employed. Such was the case with MICS items like items with "righting reflex", and "using complex reflections to reframe". Rather, two items were added to specifically address competencies taught in the course, i.e., items regarding rolling with resistance and using a 10-point scale to assess a patient's readiness for change. This adapted ("MICS-A") instrument solicited students' perceived self-efficacies on each of the 20 items on 11-point Likert-type scales.

Attitudes toward interprofessional collaboration was measured using the Interprofessional Attitudes Scale (IAS).²⁰ The instrument has 14 question in which respondents indicate their agreement to 5-point, Likert-type scale items related to their attitudes toward interprofessional education, such as is putative benefit for patient care, its efficiency versus being taking up too much time, it helping to create a spirit of teamwork and camaraderie, and it helping promote understanding of other professions.

Professional identity formation was measured with the use of the Macleod Clark Professional Identity Scale (MCPIS) which accounts for an understanding between one's work and their identity.²¹ This scale allows one to ascribe their feelings about their gratitude or regret for being a member of the profession, the pride associated with their affiliation, and their feeling of belonging to and engaging in a life-long career in the profession.²¹ The Macleod Clark Professional consists of 9 items measured on 5-point Likert-type scales of agreement.

On the second survey following the debriefing session, an additional qualitative component was added. Students were requested to answer questions concerning what about the learning intervention could be improved, the extent to which they learned more about the roles and approach of their health professions student counterparts, and their thoughts on the delivery of interprofessional care.

2.3. Analysis

An exploratory factor analysis was conducted on the responses to the motivational interviewing self-efficacy, attitudes toward interprofessional care, and professional identity items to discern their discriminant validity. This and Cronbach's alpha analysis were also used to discard any items not supporting the instrumentation or performing poorly psychometrically. The responses to the items for each instrument were summed to create an overall score for each. The overall scores were compared pre- and post for all students combined using independent

sample *t*-tests as were comparisons between pharmacy and PA students. One-way analyses of variance and Pearson correlation tests were used to determine any relationships between survey responses to any of the three response variables with student age, sex, and ethnicity, as appropriate.

Responses to the open-ended qualitative responses were reviewed by two independent coders for content analysis thematic analysis following principles described by Kyngas.²² Coders familiarized themselves with the data and generated preliminary codes. Coders independently assigned codes to meaningful text and grouped related codes into preliminary themes. Consensus coding was reached for all themes with a third reviewer finalized the coding structure. Inter-coder reliability was achieved between coders before finalizing themes.

3. Results

Demographic characteristics of student participants are provided in Table 1. There were 34 pharmacy students enrolled in the course and present for the lecture and administration of the survey, whereas there were 46 PA students. Overall, approximately half of the students from both programs were of Asian descent. Female students represent a majority in both programs. The second survey administration saw students declining to complete it, especially among PA students, as the survey was administered at the end of a full afternoon presumably with students who might have been tired and ready to depart from class. In particular, fewer of the PA students participated in the post-survey, which might account for some shifts in the demographic composition compared to the pre-survey.

A principal component analysis on items comprising all three measures/scales provided evidence of discriminant validity, as items loaded onto their suspected constructs with very little cross loading. There were 4 dimensions/factors for the MICS-A, three factors/dimensions for the IAS and two for the MCPIS, respectively. There was no attempt to further analyze the factors/dimensions of each scale or compare student responses to these individual factors, versus the composite measures. The Cronbach's alpha measure of internal consistency reliability for the MICS-A, IAS, and MCPIS were 0.92, 0.83, and 0.78, respectively.

Table 2 provides responses to the pre- and post-survey responses to

Table 1
Demographic characteristics of respondents.

Characteristic	n (%) Pre	n (%) Post
Student Major		
Pharmacy (1)	32 (41.6 %)	23 (47.9 %)
Physician Assistant (2)	45 (58.4 %)	25 (52.1 %)
Student Race/Ethnicity		
White (1)	13 (16.9 %)	4 (8.3 %)
Black/ African American (2)	7 (9.1 %)	6 (12.5 %)
Asian or Pacific Islander (3)	38 (49.4 %)	24 (50.0 %)
Native American, Native Alaskan, First People(4)	0	0
Hispanic or Latin (5)	13 (16.9 %)	8 (16.7 %)
Middle Eastern (6)	2 (2.6 %)	2 (4.2 %)
Multiracial (7)	2 (2.6 %)	2 (4.2 %)
Other (8)	1 (1.3 %)	1 (2.1 %)
Prefer not to answer (9)	0	0
Student Gender		
Male (1)	18 (23.4 %)	10 (20.8 %)
Female (2)	59 (76.6 %)	38 (79.2 %)
Transgender Male /Transgender Female /Non-Binary /Other /Prefer not to answer	0	0

Table 2

Mean responses to the adapted Motivational Interviewing Confidence Scale (MIC-S)*.

Confidence Scale	Mean \pm s.d. COP Response Pre	Mean \pm s.d. COP Response Post	Mean \pm s.d. PA Response Pre	Mean \pm s.d. PA Response Post
1.Introduce yourself to a new client	9.90 \pm 2.04	10.14 \pm 1.98	10.28 \pm 2.09	10.41 \pm 2.05
2.Invite the client to talk about behavior change using agenda settings.	7.00 \pm 2.11	7.15 \pm 1.99	7.88 \pm 2.07	7.88 \pm 2.07
3.Solicit client participation despite recent client refusal.	5.42 \pm 2.22	5.88 \pm 2.02	5.88 \pm 2.05	6.79 \pm 2.18
4.Elicit the client's understanding of illness/treatment/ lifestyle or situation	7.60 \pm 1.99	7.74 \pm 1.90	7.80 \pm 2.09	7.99 \pm 2.11
5.Demonstrate sensitivity and openness to client's concerns.	9.02 \pm 1.91	9.34 \pm 1.87	9.06 \pm 2.05	9.44 \pm 2.00
6.Ask mainly open-ended questions during client conversations.	9.81 \pm 2.02	10.21 \pm 1.85	10.02 \pm 2.22	10.65 \pm 1.95
7.Express empathy by reflecting a client's emotions during an interview	10.02 \pm 1.88	10.07 \pm 1.89	10.11 \pm 1.99	10.35 \pm 1.98
8.Provide affirmations to help the client identify strengths & past successes and support their motivation to change	8.05 \pm 1.98	8.23 \pm 1.96	8.12 \pm 2.10	8.56 \pm 2.03
9.Do more listening than talking during the client interaction.	8.80 \pm 1.91	9.10 \pm 1.91	8.89 \pm 2.09	9.36 \pm 2.00
10.Invite the client to talk about and explore his/her own ideas for change.	7.77 \pm 2.07	7.95 \pm 1.94	7.88 \pm 2.11	8.33 \pm 2.04
11.Elicit client's motivators and barriers for behavioral change.	7.22 \pm 2.20	7.41 \pm 2.01	7.38 \pm 2.12	7.85 \pm 2.10
12. Roll with resistance offered by a client for their offering a rationale to maintain their current behavior.	8.70 \pm 1.98	8.85 \pm 1.93	8.88 \pm 2.09	9.22 \pm 2.11
13. Develop discrepancy between the client's desired health outcome/ goals and present behaviors.	6.75 \pm 2.19	7.34 \pm 1.87	7.01 \pm 2.28	7.92 \pm 1.99
14. Avoid imposing your own agenda to the client.	6.81 \pm 2.18	7.02 \pm 1.90	7.32 \pm 2.22	7.65 \pm 1.95
15. Avoid interrupting the client.	9.80 \pm 1.87	9.75 \pm 1.83	9.91 \pm 2.01	10.23 \pm 1.90
16. Use reframing to suggest different meanings to the	6.69 \pm 1.91	6.81 \pm 1.85	7.26 \pm 1.90	7.39 \pm 1.94

Table 2 (continued)

Confidence Scale	Mean \pm s.d. COP Response Pre	Mean \pm s.d. COP Response Post	Mean \pm s.d. PA Response Pre	Mean \pm s.d. PA Response Post
client about their perceived situation.				
17. Consistently respond to potential change talk with reflections, elaborations or interest.	8.12 \pm 2.02	8.38 \pm 1.80	8.37 \pm 2.08	8.91 \pm 1.84
18. Use a scale (eg. "1" to "10") to help support a client's readiness for change.	7.97 \pm 1.98	8.08 \pm 1.88	9.04 \pm 2.04	9.66 \pm 2.00
19. Rely on your personal coping abilities to remain calm when the client has co-occurring issues.	8.01 \pm 2.17	8.14 \pm 1.83	8.11 \pm 2.20	8.69 \pm 2.05
20. Actively convey respect for client choice behavior change.	8.88 \pm 1.98	9.04 \pm 1.80	9.04 \pm 2.06	9.50 \pm 1.98
Total	162.34 \pm 33.41	166.53 \pm 31.98	167.07 \pm 34.88	176.38 \pm 35.19

* MIC-S items measured on a scale from 1 to 11.

the motivational interviewing MICS-A assessment. On the pre- surveys, there were trends particularly in some items where PA students reported higher self-efficacy, though the difference did not achieve significance. On the post-assessment, there was a significantly higher overall reported self-efficacy by the PA students versus the COP students. An independent sample *t*-test did not reveal differences in Neither the pre- nor the post-MICS scores across sex. For analysis purposes here and for other construct analyses, race/ethnicity was collapsed into 4 categories, i.e., respondents were: Asian/Pacific Islander, Hispanic/Latin, White, and All Other (including Black African, multiracial, and "other"). A one-way analysis of variance (ANOVA) saw no differences on the MICS-A instrument on either the pre- or post-assessment across races/ethnicities. For all students combined, there was a trend toward higher means on the post- versus the pre-survey, though this did not achieve statistical difference. In consideration of potential Type 2 error, statistical analyses were not conducted on individual items comprising the MICS-A or any other instrument. In general, both sets of students reported higher self-efficacies on introducing themselves to the patient, asking open-ended questions, expressing empathy, AND avoiding interrupting the patient. Lower self-efficacies were reported to solicit client participation upon their initial refusal and developing discrepancy. These might be thought of as more challenging or more advanced MI skills, and interestingly, they were among the items that saw gains in self-efficacy of over half to one full point from the pre- to the post surveys on the 5-point, Likert-type scales.

Table 3 provides responses to the pre- and post-survey responses to the Interprofessional Attitudes Scale (IAS). There were no statistical differences in the summated item measure between COP and PA students on the pre-survey. On the post-survey there was a trend for somewhat higher mean responses from the PA versus the pharmacy students, though this did not achieve statistical difference. For both COP and PA students combined, there was a statistically higher mean response to the IAS post- as compared to pre-survey. In general, item means that remained a bit lower on the IAS pre- and post-survey pertained to interprofessional collaboration helping the provider to meet informal caregiver needs and patients' emotional and financial needs.

Table 3

Mean responses to the Interprofessional Attitudes Scale (IAS)*.

Interprofessional Attitudes Scale Items (IAS)	Mean \pm s.d. COP Response Pre	Mean \pm s.d. COP Response Post	Mean \pm s.d. PA Resume Post	Mean \pm s.d. PA Post
1. Patients/clients receiving interprofessional care are more likely than others to be treated as whole persons.	4.17 \pm 1.31	4.42 \pm 0.97	4.22 \pm 1.24	4.61 \pm 0.99
2. Developing an interprofessional patient/client care plan is excessively time consuming.**	2.99 \pm 1.38	2.91 \pm 0.88	2.94 \pm 1.33	2.87 \pm 0.90
3. The give and take among team members helps them make better patient/client care decisions.	4.24 \pm 1.22	4.25 \pm 1.01	4.30 \pm 1.26	4.58 \pm 1.03
4. The interprofessional approach makes the delivery of care more efficient.	4.16 \pm 1.28	4.24 \pm 1.03	4.22 \pm 1.33	4.44 \pm 1.10
5. Developing a patient/client care plan with other team members avoids errors in delivering care.	4.20 \pm 1.21	4.31 \pm 1.00	4.28 \pm 1.27	4.50 \pm 1.05
6. Working in an interprofessional manner unnecessarily complicates things most of the time.**	2.28 \pm 1.19	2.31 \pm 1.04	2.25 \pm 1.27	2.12 \pm 1.10
7. Working in an interprofessional environment keeps most health professionals enthusiastic and interested in their jobs.	3.65 \pm 1.33	3.69 \pm 1.11	3.82 \pm 1.22	3.94 \pm 1.09
8. The interprofessional approach improves the quality of care to patients/clients.	4.29 \pm 1.19	4.35 \pm 1.07	4.49 \pm 1.15	4.48 \pm 1.13
9. In most instances, the time required for interprofessional consultations could be better spent in other ways.**	2.33 \pm 1.26	2.31 \pm 1.14	2.41 \pm 1.22	2.18 \pm 1.18
10. Health professionals working as teams are more responsive than others to the emotional and financial needs of patients/clients.	3.97 \pm 1.22	3.97 \pm 1.09	4.06 \pm 1.24	4.22 \pm 1.14
11. The interprofessional approach permits health professionals to meet the needs of family caregivers as well as patients.	3.95 \pm 1.08	3.99 \pm 1.07	4.13 \pm 1.09	4.18 \pm 1.18
12. Having to report observations to a team helps team members better understand the work of other health professionals.	4.23 \pm 1.02	4.29 \pm 0.99	4.41 \pm 1.02	4.58 \pm 1.08
13. Hospital patients who receive interprofessional team care are better prepared for discharge than other patients.	4.19 \pm 1.09	4.30 \pm 1.07	4.28 \pm 1.15	4.37 \pm 1.11

Table 3 (continued)

Interprofessional Attitudes Scale Items (IAS)	Mean \pm s.d. COP Response Pre	Mean \pm s.d. COP Response Post	Mean \pm s.d. PA Resume Post	Mean \pm s.d. PA Post
14. Team meetings foster communication among team members.	4.26 \pm 1.02	4.33 \pm 1.04	4.32 \pm 1.10	4.46 \pm 1.05
Total	55.61 \pm 10.24	56.51 \pm 9.95	56.93 \pm 11.55	59.03 \pm 12.18

* IAS items measured on a scale from 1 to 5.

** Item reverse coded for total scoring.

Table 4 provides responses to the pre- and post-survey responses to the Macleod Clark Professional Identity Scale (MCPIS). The pre- and post-survey results show significantly higher professional identity formation scores for the PA versus the pharmacy students. There were overall higher scores on the MCPIS for the post- versus the pre-survey results aggregated among both sets of students. There were no differences in professional identity formation scores by sex nor by race/ethnicity on either the pre- or post-survey results. In general, students responded most favorably to items on being pleased to be in their profession and the profession being important to them, but a bit lower on having strong ties and belonging in the profession, which might reflect

Table 4

Mean responses to the Macleod Clark Professional Identity Scale (MCPIS) *.

MCPIS Items	Mean \pm s.d. COP Response Pre	Mean \pm s.d. COP Response Post	Mean \pm s.d. PA Response Pre	Mean \pm s.d. PA Response Post
1. I feel like I am a member of this profession.	3.81 \pm 0.98	4.05 \pm 1.01	4.22 \pm 1.05	4.50 \pm 1.04
2. I feel I have strong ties with members of this profession.	3.88 \pm 0.97	4.19 \pm 0.95	4.20 \pm 1.10	4.49 \pm 1.10
3. I am often ashamed to admit that I am studying for this profession. **	1.34 \pm 0.88	1.20 \pm 0.82	1.31 \pm 0.98	1.14 \pm 1.02
4. I find myself making excuses for belonging to this profession. **	1.40 \pm 0.86	1.29 \pm 0.81	1.30 \pm 0.99	1.08 \pm 1.03
5. I can identify positively with members of this profession.	4.09 \pm 1.01	4.26 \pm 0.84	4.40 \pm 1.08	4.65 \pm 0.90
6. I try to hide that I am studying to be part of this profession. **	1.30 \pm 0.99	1.15 \pm 1.03	1.15 \pm 1.07	1.14 \pm 1.04
7. I am pleased to belong to this profession.	4.40 \pm 0.98	4.50 \pm 0.90	4.59 \pm 1.10	4.74 \pm 0.99
8. I can identify positively with members of this profession.	4.30 \pm 0.99	4.48 \pm 0.88	4.54 \pm 1.11	4.78 \pm 1.03
9. Being a member of this profession is important to me.	4.45 \pm 0.91	4.72 \pm 0.85	4.69 \pm 1.03	4.89 \pm 1.07
Total	35.89 \pm 9.04	37.86 \pm 8.88	37.88 \pm 10.11	39.69 \pm 9.26

* MCPIS items measured from 1 to 5.

** Item reverse coded for total scoring.

their being so new, or very early in their professional journey being first- and second-year students.

Table 5 provides the thematic codes found in qualitative assessment. Students commented on themes of preparation and clarity of expectations the most ($n = 16$) followed by interprofessional collaboration and impact on professional development ($n = 15$) and role and team dynamics ($n = 9$). Students provided insights for improvement in the exercise including more cases or SPs so that everybody gets to lead a conversation.

4. Discussion

This study saw the exposure of PGY1 (first professional year in the PharmD program) and PA-S2 students together for a learning experience in motivational interviewing that employed a didactic lecture, joint interactions with standardized patients, and a debriefing in assigned groups/teams discerning similarities and differences in their approaches with the SPs and brief discussions of their roles in treating patients. Self-efficacy for motivational interviewing improved more so for PA students than for COP students, even in spite of PA students having entered the endeavor with more experience. Interestingly, self-efficacy did not improve substantially following the learning experience. However, the learning experience saw improved scores in attitudes toward interdisciplinary care and professional identity formation from pre- to post-

survey, with PA students especially reporting higher professional identity.

The qualitative comments from the post-survey suggest that the more inexperienced COP students might not have been fully prepared or possibly overestimated their ability to interact effectively with the SPs. The PA students were in their second year, versus COP students in their first, a factor to which a few COP and PA students made note of in their qualitative responses. The experience might have further strengthened both COP and especially PA students' sense of identity given these additional experiences with SPs, which would corroborate findings by Sharpless et al.,²³ where reflection on practice experiences by students improved PIF. It was found that students were expected to immerse themselves in the behaviors consistent with their future roles and had to transition from laypersons to professionals, which also involved separating prior identities, ideas about their role, and image along with their visions for the future in developing "new ways of being". Sharpless et al.²³ highlighted the themes of an active and constructive process of professional identity formation which was also similar with the COP and PA students. Sharpless et al. noted key factors essential for professional identity formation such as forming meaningful patient relationships that eventually result in "reflection-on-action" and "reflection on being", which emphasize the importance of the role of relationships in professional identity formation. Indeed, while Malewski and Desselle²⁴ reported gains in pharmacy students' initial attitudes toward MI following an interactive experience, the inclusion of additional health professions students in the learning experience and in reflection during debriefing might add further value to the experience. For future events, coordinating schedules for all students is essential. A PGY1 wrote, "Maybe having these events further from exams so students feel less stress and more engaged". The self-efficacy gained in this experience could vary based on a number of confounding variables including exam schedule.

Several studies have examined how healthcare professionals perceive MI, utilize it in their practice, and how clinical experience relates to their performance in MI. Cook et al.²⁵ emphasized that trainees with more clinical experience or repeated clinical exposure are more likely to develop better receptivity to MI. Additionally, improvement in MI-related knowledge, attitudes, and behaviors is largely influenced by professional experience. Similarly, healthcare professionals and educators are more likely to possess strong MI skills compared to non-healthcare individuals. Lastly, more years of clinical experience correlate with higher MI-related knowledge.²⁵ As a result, first-year pharmacy students may not have sufficient exposure to patient interactions and clinical experiences, making them less likely to have extensive knowledge of MI. This suggests that ongoing training and practical experience are key components for reinforcing the effectiveness of MI within pharmacy education.

Stull and Blue²⁶ found that an introductory IPE course did not positively affect student attitudes toward other professions in terms of enhancing professional identity, it also did not promote readiness for interprofessional learning. The findings highlight that early exposure to interprofessional education may raise awareness of other professions; however, it is not sufficient in establishing lasting identity transformation, and overcoming pre-existing professional stereotypes without constant, immersive experiences that challenge and sharpen students' self-concepts. As students internalize the expectations and norms of their selected profession, they often fall victim of locating comfort within in-group identity—that can lead to distancing from other professions—and only later, via self-reflection and in-discipline practical experiences, are they able to cultivate an integrated interprofessional outlook. Yet, the current study revealed gains in PIF, which could be at least somewhat attributable to the groups debriefing with one another, the requirement that they discuss one another's roles, and observe the unique approaches and experiences they undertook with them as they engaged the SPs. Khalili and Orchard²⁷ likewise saw improvements in both unprofessional and interprofessional identity formation from a similar endeavor with various health professions students

Table 5
Thematic coding of open-ended questions.

More Cases & Patients.	$n = 4$
● Sufficient number of SPs so that everybody can practice engaging with the SP.	
Consider a one-to-one ratio of PA to PharmD students ($n = 1$)	
Clarity in expectations.	$n =$
Both PGY1 and PA-S2 wanted more well-defined format prior to participation in the simulation.	16
Concordance of academics	$n = 4$
Mixing PA-S1 with PGY1s in the future would increase satisfaction and "level playing field" versus current structure which includes PA-S2 and PGY1s.	
Role & Team Dynamics	$n = 9$
● Both PA-S2 and PGY1s gained insight into their professional roles; however, both wanted more well-defined role in the activity.	
● Both PA-S2 ($n = 1$) and PGY1 ($n = 2$) appreciated the different ways of approaching patients by other professions.	
"PA students are very good at addressing the patient's problems... while the pharmacy students tend to focus on medication" -PGY1	
Two PA students specifically commented about the PGY1s inexperience as a barrier to improving the PA student knowledge of the PharmD role. The activity, "it didn't improve my understanding of the pharmacist's role since many of the students were...only a month into their program. They are new and are unable to interact with patients as comfortably." - PA-S2	
Two PA-S2 commented that the activity improved their understanding of the pharmacist role to include roles outside just medication information. "I enjoyed seeing the pharmacy students interact with patients and demonstrate their priorities and way of communicating with patients. I will use this knowledge in practice when collaborating with pharmacists".	
Interprofessional collaboration & impact on professional development	$n =$
● P1s expressed activity was helpful for communication ($n = 1$), skill development ($n = 3$), relationship with providers ($n = 1$)	
● PAs ($n = 10$) reported IPE important for collaboration and learning PharmD point-of view.	
"I value [IPE] greatly – when I used to work at a community health center, I was able to see how clinicians, counselors, case managers, MAs, and social workers interacted to provide quality care and this [activity] reminded me of it". -PA-S2	

in IPE activities outside of an MI experience.

The aforementioned Stull and Blue²⁶ findings suggest interprofessional education requires a longitudinal approach with continuous integration of practices that allow students to self-reflect on their roles, engage in interprofessional communication, role play, and foster critical thinking of interprofessional identity. Even this initial, relatively early experience for health professions students demonstrated improvements in attitudes toward interdisciplinary care. Swinnen et al.²⁸ saw a significant improvement in perception of competence and perception of cooperation following an intervention that had medicine, nursing, and dietician students working together and reflecting with one another. It has been suggested that student IPE experiences involving joint reflection can later impact health professionals' competence and response empathy.²⁹ Additionally, incorporating MI training into IPE experiences appears to provide students with a "common language and approach" to providing care.³⁰

4.1. Limitations and future study/implications

The results related to self-efficacy, attitudes toward interprofessional education, and professional identity formation relied on students' self-report. The possibility of at least some students reporting what they might believe the presiding faculty instructors might "want to hear" cannot be precluded. Responses to the pre- and post- surveys were not required, which is a positive inasmuch as mitigating possible biases and reinforcing autonomy; however, engagement in the post- surveys saw a decline as compared with the pre-surveys. A strength of the study hinges much around the course design, which includes lecture, videos, use of SPs, and comprehensive and guided reflection. Students were strongly encouraged not to provide socially desirable responses, and it was quite evident that this was indeed the case among their responses. These strengths lend well to future applications incorporating IPE where students reflect, work in teams, and get to know one another and discuss their respective approaches. Future studies might attempt to disentangle the effects of individual components of the entire intervention so as to further strengthen these components and perhaps make alterations that even further improve the experience.

5. Conclusion

An IPE experience involving pharmacy and physician assistant students employing motivational interviewing with group debriefing and reflection appeared to be successful on a number of fronts. Post experience attitudes toward interprofessional care and professional identity formation improved, particularly upon witness to and contemplation of various approaches taken to interaction with standardized patients. In fact, gains in these areas were found to be greater than in actual gains in self-efficacy for performing MI, which might be due to students' lack of prior experience in dealing with SPs. Comments from participants in addition to other evidence would suggest that students would benefit from more longitudinal experiences following this initial endeavor and that attempts be made to integrate health professions students at similar years of training (eg, PGY1 or PGY2) when designing such IPE events.

CRediT authorship contribution statement

Shane Desselle: Conceptualization, Formal analysis, Methodology, Project Administration, Supervision, Writing – review & editing. **Joy Moverley:** Formal analysis, Methodology, Project Administration, Supervision, Writing – review & editing. **Jamila Beckford, Anh Vo, Karen Sarpong, Irene Bugriyev:** Data curation, Writing – original draft.

Declaration of competing interest

The authors have no conflicts of interest to declare.

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