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ORIGINAL RESEARCH

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The impact of early exposure to standardized patient interviews on communication skills among pre-clinical BA/MD students: A mixed methods study

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ABSTRACT

Objectives: To investigate whether early participation in formative standardized patient interviews (SPIs) in year 2 of a 6-year accelerated BA/MD program would improve students' communication skills in year 3, as well as to explore self-perceptions of the development of those skills.

Methods: We randomly selected 23 year 2 students to participate in an intervention group, and then purposively selected 23 matching students for a control group. All participants underwent the usual educational experiences; however, participants in the intervention group also experienced four video-recorded SPIs over the course of the academic year. Formative feedback was provided to students by the standardized patients and, subsequently, by faculty who viewed the videos. Participants in the intervention group and their faculty periodically completed self-report surveys. During the first semester of year 3, all students underwent a series of three SPI-based clinical performance assessments (CPAs), assessing communication skills, professionalism, and history-taking. We then compared the CPA scores of the intervention and the control groups. We also examined survey responses quantitatively and qualitatively to determine faculty and students' self-perceptions.

Results: The intervention group scored significantly higher than the control group in the total score for the three CPAs. Survey responses showed a perceived positive value of early exposure to SPIs on enhancement of students' comfort level and skills in interviewing "real" patients.

Conclusions: This study suggests that earlier implementation of pre-clinical SPIs provides valuable formative assessment to students on their communication and patient interviewing skills and prepares them for future standardized and "real" patient encounters.

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Introduction

Communication is a key component of the physician–patient relationship. Not surprisingly, in recent years, communication has been considered a primary criterion in licensing and certification examinations. Effective physician communication skills have long been associated with improved health outcomes [1], which include patient satisfaction [2], lower cost of care [3], and better patient compliance with recommended treatments [4]. As Maguire and Pitceathly [5] attest, good communication and interpersonal skills in medical practice are not innate; rather, they are learned and can always be enhanced. It is, therefore, imperative that future physicians are taught to develop strong communication and interpersonal skills during their medical school training to foster later development of effective physician–patient relationships [6].

Prior research has unveiled multiple instructional methods that medical schools employ to teach communication and interpersonal skills. These include traditional lecture [7], individual mentoring [8], role-playing [9], and demonstration [6]. Cumulative research has, however,

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shown superiority of experiential as compared to purely didactic methods [7,10]. In particular, the use of standardized patient interviews (SPIs) has proven to be one of the most prominent and innovative methods of teaching both general and specific communication skills [11]. The Association of Standardized Patient Educators [12] defines a standardized patient as a person trained to simulate a patient accurately, including health history, a health concern, clinical symptoms, and communication while providing evaluation and feedback to the student with the use of a checklist. As Burrow [13] further reiterates, the standardized patient must be able to consistently deliver a similar performance when interacting with different students.

The value of using SPIs in teaching communication skills is grounded in the fact that SPIs augment a variety of clinical scenarios for medical students with a high degree of realism. As compared to written examinations, SPI's can, thus, be more helpful in formative assessment of medical students because they represent the clinical setting [14]. When compared to real patients, SPIs provide a superior learning environment because the setting offers safety for students to make mistakes without causing harm to a real patient [15]. As Webster [16] submits, students can experience the initial stress, awkwardness, and confusion of office visits in a controlled setting. This is an invaluable experience, especially for students who are just beginning medical school and are seeking to become comfortable interacting with real patients. SPIs also provide an effective alternative to clinical placements in teaching communication skills in that standardized patients are adaptable to students' learning needs, thus, allowing faculty to target teaching more accurately [15]. Another advantage is that SPIs minimize variability in learning experiences between students [16]. Moreover, SPIs are readily available, unlike encounters with real patients whose presence is difficult to control. The superiority of SPIs is also grounded on its patient-centered approach, which is instrumental in fostering physician–patient relationship [11,17]. Physician–patient relationship is the cornerstone of overall health outcomes [18,19]. A study by Tamblyn et al. [19] evaluated the validity of using standardized patient ratings in predicting physician–patient relationship and found the ratings to be a valid predictor of real patient satisfaction. Considering the advantages of using SPIs as a teaching method, it is not surprising that prior research has revealed a general preference by students for SPIs over other alternative teaching methods, for example, written patient case scenarios, peer role-playing, or real patients; especially when assessing for physician–patient relationship [15,20,21].

In keeping with the perceived advantages of SPIs over other teaching methods, the use of SPIs for teaching and/or assessment in medical schools has increased dramatically over the past two decades with many new SPI programs being established in the United States and worldwide [22]. A review of the literature and medical school websites, however, unveils enormous variability in the modalities of SPI programs among medical schools. Notable differences are apparent in the selection and training of the standardized patients, implementation procedures [23], as well as the logistics of when SPIs are introduced to students in their curriculum. Most medical schools in the United States introduce SPIs for purposes of teaching communication skills during the second year of the traditional 4-year post-baccalaureate medical curriculum. A few other medical schools prefer introducing SPIs to students in their clinical years. A review of medical programs outside of the United States has revealed even more variability with regards to when medical students are first introduced to SPIs.

Rationale and Purpose

The apparent variations in the use of SPIs among different medical schools make it difficult to determine the optimal time in the medical school curricula at which SPIs should be introduced to students specifically for purposes of teaching communication and interpersonal skills. This difficulty is exacerbated by the fact that available literature on the use of SPI's in teaching communication skills in the United States is limited to traditional post-baccalaureate 4-year medical programs. There is, conceivably, a gap in literature regarding the use of SPI's from non-traditional accelerated/combined Baccalaureate/Doctor of Medicine (BA/MD) programs in the United States. This study, thus, sought to close the gap by investigating the effectiveness of SPIs on one of these relatively few and less studied programs. The study investigated whether participation in formative SPIs during pre-clinical year 2 of an accelerated BA/MD 6-year program would improve students' communication skills in year 3. Empirical findings of this study could provide

potentially helpful insights into assessing the need for expanding SPI programs in pre-clinical years within the context of accelerated BA/MD programs in the United States, Europe, and perhaps elsewhere.

Background and Setting

Accelerated medical programs such as those offered at the University of Missouri-Kansas City (UMKC) School of Medicine provide students the ability to earn a combined BA and MD degrees during a 6-year period. Students begin the program as undergraduate college freshman in the fall semester, having graduated from high school earlier in the spring of that same year. The first 2 years of the program are mainly devoted to fulfilling baccalaureate degree requirements while subsequent final 4 years are dedicated to traditional medical school coursework. Although the first 2 years are reserved primarily for baccalaureate degree coursework, students also spend 25% of their time engaged in medical school curriculum. They are required to take a series of four 5-credit-hour courses entitled: *Fundamentals of Medical Practice I* through *IV*. A major component of these courses is dedicated to learning general communication skills, professionalism, patient interviewing, and presentation skills. As part of this series of courses, each student spends 2 hours per week in a small group of 10–15 students. A different physician faculty member, called a docent, leads each group. Docents are expected to directly observe each student interviewing a real patient and then give feedback on that student–patient encounter at least once each semester.

Although students already have some exposure to real patients as early as their first of the 6-year program, SPIs are not currently available to year 1 and year 2 students. Rather, SPIs are incorporated into the clinical curriculum of year 3–year 5 as a component of a series of clinical performance assessments (CPAs) for both formative and summative assessment purposes. The first CPA, conducted early in year 3, is dedicated exclusively to assessing communication skills and professionalism. Subsequent year 3 CPAs also assess history-taking and physical examination skills.

Considering the uniqueness of the UMKC medical curriculum and the overall gap in literature regarding accelerated/combined BA/MD programs in the United States, the primary purpose of this study was to determine the impact of exposure to SPIs in pre-clinical year 2 on students' communication skills when they progress to year 3 CPA, within the context of accelerated BA/MD programs. We hypothesized that participation in formative SPIs would improve students' communication skills by year 3 CPA. An additional purpose of this study was to explore participants' personal experiences and perceptions, using self-reflections, of formative SPIs in relation to their perceived overall communication and interpersonal skills.

Methods

Research design

The study employed a mixed methods research design. As Creswell and Clark [24] posit, utilizing a mixed methods approach provides researchers with multiple perspectives from which to investigate a phenomenon. Our primary objective for adopting a mixed methods design was to obtain a more complete understanding of the impact of early exposure to SPIs on students' communication skills. Specifically, we utilized an embedded mixed methods research design where one data set provided a supportive, secondary role to a study primarily based on the other data type [24]. The qualitative method was embedded or nested within the quantitative method. An embedded mixed methods design was deemed appropriate because quantitative and qualitative data were intended to answer different research questions within the study [25]. The primary quantitative method, a quasi-experimental design, sought to explore the effects of our intervention (early exposure to SPIs), whereas the secondary method sought to explore participants' experiences of the intervention, as well as its perceived impact on their communication skills in year 3.

Participants and sampling

This study was conducted with medical students enrolled in the accelerated/combined, 6-year BA/MD program at UMKC School of Medicine. Prior to initiation of the study, we educated all 10 year 2 docents about the study. While all docents were encouraged to participate, their participation was voluntary. A total of 8 out of 10 docents volunteered to participate; as a result, prospective volunteer student participants were recruited only from participating docents' teams. We then randomly selected 23 participants from a pool of volunteers, who participated in an intervention over the course of the 2015–2016 academic year. Only 23 participants were selected because of the scarcity of SPI

resources above and beyond the resources traditionally reserved for year 3–year 5 students. We then employed objective purposive sampling to select participants deemed homogenous to the intervention group for the control group. To ascertain that our purposive sampling was objective, we selected participants for the control group prior to accessing year 3 CPA scores. To enhance the homogeneity of the two samples, we selected an equal number of participants for the control group to that of the intervention group, within each of the eight participating teams. This eliminated the potential influence of the docent as a clinical mentor and the clinical setting (which varied from docent to docent but was the same for all students in a particular docent group) as moderating variables. To further enhance equivalency of the two samples, we recruited participants for the control group with the closest pre-CPA Grade Point Average (GPAs) to corresponding participants in the intervention group, within the same team. A non-significant *t*-test result ($t = 0.433$, $p = 0.667$) confirmed homogeneity of the two samples in terms of their pre-CPA GPAs. The intervention and the control groups were also very similar at baseline with regards to the demographic factor of gender. A higher degree of equivalency of the two samples at baseline mitigated the influence of individual differences in students' prior academic performance as a confounding factor. Table 1 shows participants for the intervention group, corresponding selected participants for the control group, and their respective pre-CPA GPA and CPA scores.

Data collection procedures

We employed a multiple-phase embedded mixed methods research design in which data were collected sequentially. All students went through the usual and customary educational experiences during their weekly 2-hour meetings with their docents. However, in addition to the routine educational experiences, participants in the intervention group were required to experience four SPIs with subsequent feedback over the course of the 2015–2016 academic year (two per semester). Each SPI was video-recorded. The standardized patients provided immediate formative verbal feedback to the participants, which was also video-recorded. Additionally, standardized patients completed a grading sheet for each participant. Immediately following each of the four SPIs, participating students completed self-evaluation forms to reflect on their experiences. Then, within approximately 1 week of the SPIs, participants reviewed the video-recorded interviews with their docents for formative feedback. Participants in the intervention group completed a survey immediately after completing all four SPIs. Participating docents also completed a survey to reflect on perceived progress of participating students over the course of the series of the four SPIs.

The following academic year (2016–2017), all students, including those in the intervention group, underwent a series of CPAs, three of which were successively undertaken during the first semester of year 3. The first CPA was purely Communication and Professionalism (ComProf); the second was ComProf, history-taking (Hist.), and physical exam; and the third was Hist. and physical exam. Physical exam CPA scores were excluded from the analysis because the skill was not included during the intervention. Student participants completed another follow-up survey after completing year 3 CPAs.

We developed all the survey instruments (See Tables 3–5 for individual survey items). Survey responses were rated on a five-point Likert scale of *Strongly Agree* to *Strongly Disagree*. Each survey contained an open-ended item, which solicited detailed descriptions of participants' experiences, as well as the perceived impact of early exposure to SPIs in year 2 on communication skills in year 3.

Data analyses

The first study objective was to determine whether students' participation in formative SPIs in the pre-clinical year 2 would improve their communication skills in year 3 CPA. For this study aim, we used SPSS version 22 for quantitative data analyses. We first performed independent sample *t*-test analyses for ComProf and Hist. scores from each of the three CPA encounters to determine whether significant mean differences in performance existed between the intervention and the control groups. We also performed an independent sample *t*-test analysis for the computed grand total score (Grand Total) for all the obtained three CPA scores.

We performed repeated-measures two-way analysis of variance (ANOVA) to analyze group differences in the three successive CPA scores. To obtain a pre-intervention baseline, we converted GPAs into percentage scores and used the converted score as baseline pre-test scores. The conversion was done to enforce uniformity of scale between baseline (GPA) and CPA scores. We also wanted to determine whether participation in formative SPIs in pre-clinical year 2 would benefit

Table 1. Selected participants and their respective GPA and CPA scores.

	Intervention						Control				
Participant	**GPA**	**CPA1 ComProf**	**CPA2 ComProf**	**CPA2 Hist.**	**CPA3 Hist.**	**Participant**	**GPA**	**CPA1 ComProf**	**CPA2 ComProf**	**CPA2 Hist.**	**CPA3 Hist.**
Docent A											
1	3.772	40	89	94	67	1	3.665	15	100	88	47
Docent B											
2	4.000	70	92	88	48	2	3.749	75	100	92	73
3	3.770	90	94	96	90	3	3.539	50	89	79	83
4	3.441	45	94	81	80	4	3.377	20	83	71	48
5	3.411	65	100	92	90	5	3.262	50	100	88	85
Docent C											
6	3.766	60	78	79	80	6	3.845	40	78	79	77
7	3.800	30	89	100	67	7	3.883	75	100	92	47
8	4.000	55	83	96	80	8	3.990	45	83	83	83
9	3.290	25	67	90	87	9	3.492	50	94	88	90
10	3.988	70	100	92	64	10	4.000	85	89	69	58
Docent D											
11	3.865	40	100	96	73	11	3.762	25	75	96	83
12	3.705	65	100	83	97	12	3.700	50	100	83	87
13	2.992	55	100	100	60	13	3.386	35	100	88	97
14	3.593	55	100	96	98	14	3.590	20	97	71	77
Docent E											
15	3.423	80	94	100	93	15	3.310	40	89	71	90
16	3.896	75	94	100	83	16	3.896	70	100	96	83
Docent F											
17	3.398	80	100	96	100	17	3.388	50	100	100	92
18	3.774	45	100	100	100	18	3.6	60	94	94	33
Docent G											
19	3.371	95	83	77	77	19	3.375	35	89	81	57
20	3.983	70	78	96	72	20	3.894	60	67	79	72
Docent H											
21	3.916	30	100	96	93	21	3.800	80	78	96	55
22	3.813	65	89	100	100	22	3.799	45	94	96	90
23	3.591	65	100	88	97	23	3.523	30	89	88	60
Average	3.676	59.56	92.35	92.80	82.4		3.645	48.04	90.8	85.4	72. 5

Note: ComProf = communication and professionalism; Hist. = history-taking.

participants in the intervention group over time compared to the control group. During the ANOVA analyses, *Time* (Baseline GPA Score, CPA1, CPA2, and CPA3) served as the within-subjects variable and *Group* (Intervention *vs.* Control) served as the between-subjects variable. Using repeated-measures ANOVA allowed us to assess the main effects (mean differences between groups) and the within-group change over time. The approach also allowed us to determine whether one group changed more rapidly than the other over time (Group × Time interaction).

An additional purpose of the study was to explore students' personal experiences and self-perceptions of their participation in formative SPIs in relation to their perceived overall communication skills. We also aimed to explore participating docents' perceptions of the impact of early exposure to SPIs on their students' interviewing skills. For these study aims, data from the students' and docents' surveys

Table 2. Mean score comparison of the different components of year 3 CPA.

CPA test component	Intervention		Control		Mean diff. (%)	*t*-test score	*p*-value
	Mean (%)	SD	Mean (%)	SD			
ComProf CPA1	59.57	18.94	48.04	19.81	11.53*	2.016	$p = 0.050$
Com Prof CPA2	92.35	7.12	90.78	9.60	1.57	.565	$p = 0.575$
Hist. CPA2	92.87	7.08	85.57	9.30	7.3*	2.992	$p = 0.005$
Hist. CPA3	82.43	14.60	72.47	17.96	9.96*	2.186	$p = 0.034$
Grand total score	81.80	7.33	74.11	7.96	7.69*	3.406	$p = 0.001$

Note: ComProf = communication and professionalism; Hist. = history-taking.
*Indicate a statistically significant difference in mean score relative to control group.

were analyzed quantitatively using SPSS version 22 to obtain descriptive statistics, as well as qualitatively to obtain recurrent themes. For the quantitative analysis, Likert responses were collated, calculated, and analyzed independently of one another to reveal the categorical response for each item within each survey. Qualitative data from each survey were also extensively collated and analyzed. Using an open coding approach, one research team member first manually coded the comments for participants' general feelings and perceptions and then further coded by reoccurring themes and analyzed for associations between categories and themes. Other research team members reviewed the codes, resulting in further refinement. The final analysis of this data was intended to reveal an overarching category of students' and docents' perceptions of the SPI experience.

Results

The impact of exposure to SPIs on year 3 CPA

The first purpose of this study was to determine whether students' participation in formative SPIs in pre-clinical year 2 would improve their communication skills in year 3 CPA. Table 1 shows participants in the intervention group, corresponding selected participants for the control group, and their respective pre-CPA GPA, as well as their CPA scores.

As shown in Table 2, participants in the intervention group scored significantly higher than their counterparts in the control group on the first ComProf CPA ($t = 2.016$, $p = 0.050$); however, the difference in scores on the second ComProf CPA was insignificant ($t = 0.565$, $p = 0.575$). With regards to history-taking, participants in the intervention group scored significantly higher on both Hist. CPA2 ($t = 2.992$, $p = 0.005$) and Hist. CPA3 ($t = 2.186$, $p = 0.034$) than their counterparts in the control group. We also computed the grand total score for all three CPA encounters and a statistically significant difference was noted between the intervention and the control groups ($t = 3.406$, $p = 0.001$).

We performed repeated-measures two-way ANOVA to determine group difference in performance on the three successive CPA scores. Tests of between-subjects effects showed a significant main effect of *Group* [$F_{(3,44)} = 10.314$, $p = 0.002$], implying that participants' group membership significantly impacted their CPA scores over the three successive periods, accounting for 19% of the total variance in the CPA scores. As shown on Table 2, participants in the intervention group performed better (overall mean = 81.80) compared to their counterparts in the control group (overall mean = 74.11). We also wanted to determine whether group difference in performance would be sustained over time. A repeated measures ANOVA on the Baseline GPA Score, CPA1, CPA2, and CPA3 showed an insignificant interaction effect of *Group* × *Time* [$F_{(3,44)} = 1.59$, $p = 0.209$]. Patterns of improvement or decline between the intervention and the control groups on the three successive CPAs were not significantly different. This implies that participants in the intervention group maintained a relatively constant lead over their counterparts in the control group over the three successive CPAs. As shown in Figure 1, the difference in slopes of the two regression lines between CPAs 1, 2, and 3 was insignificant. The intervention group's average CPA score improved from 59.57 on the first CPA to 92.35 on the second CPA, whereas the control group improved from 48.04 to 90.78.

Surprisingly, participants in both groups performed worse on the history-taking component of the third CPA than they did on the second CPA. The decrease in scores was slightly worse for the control group (X decrease = −13.52) as compared to the intervention group (X decrease = −10.43).

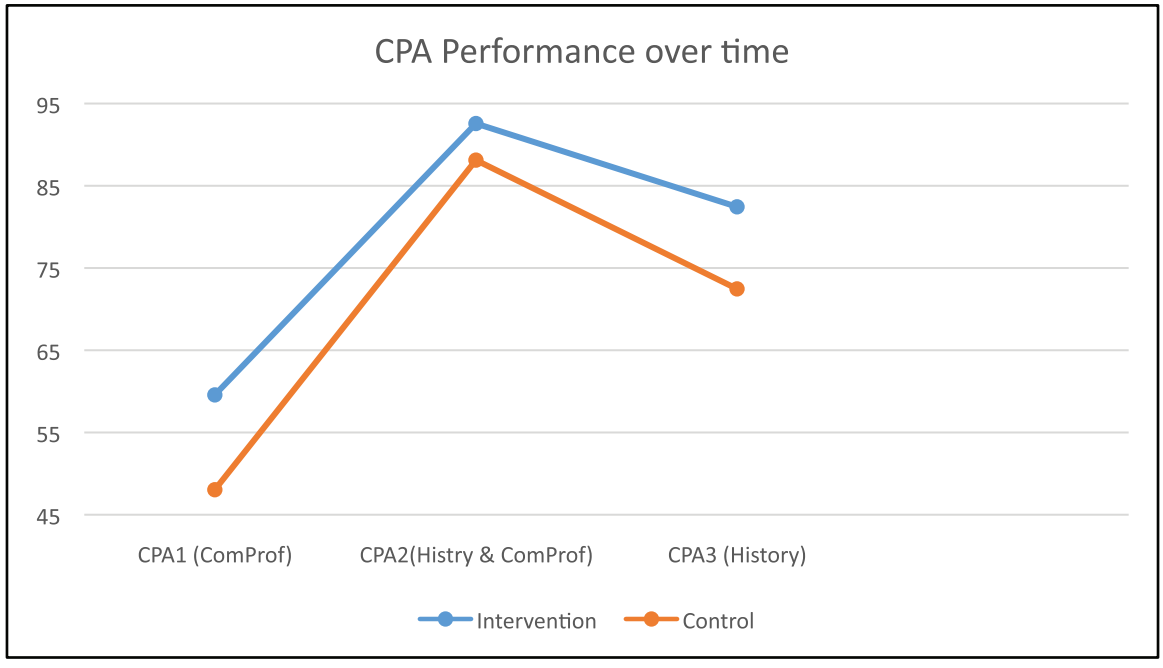

Figure 1. Participants' performance in CPA over the three successive CPA encounters.

Reported experiences and self-reflections on exposure to SPIs

Another purpose of this study was to explore participants' self-reported experiences of formative SPIs in relation to perceived overall communication and interpersonal skills. Upon completion of all four rounds of year 2 SPIs, participants completed the *End of Year 2* survey. Responses to this survey were overall very positive. As shown in Table 3, over 80% of the participants felt that SPIs helped to improve their communication and interviewing skills and made them feel more comfortable and better prepared for their forthcoming year 3 CPA.

Qualitative comments from the survey also provided evidence in support of quantitative responses. Participants expressed that SPIs had "(made them) feel more comfortable" with "real patients" and "better prepared" them for their initial year 3 CPA. Participants also responded that sentiments of "opportunity," "practice," "awareness," "knowledge," and "confidence" allowed them to *improve* their skills and *better prepare* for their approaching year 3 CPA. Sharing with many co-participants' feelings, one student noted:

> *Having the opportunity to interview... has definitely made me more confident in my abilities and it gave me a lot of key points to improve before I started talking to real patients.*

Likewise, many participants noted that SPIs provided them with an important *opportunity* to be able to view, critique, and test not only their stronger skills but also their self-perceived "weaknesses." Unnoticed body language and non-verbal communication, such as awkward gestures, were most commonly noted as an important area for personal improvement. One participant commented that "...viewing my own videos enabled me to see the areas I need to work on and notice awkward gestures." Another participant said, "I really learned a lot about keeping my (eye contact) and establishing good non-verbal communication." Importantly,

Table 3. Reported experiences of SPIs and perceived impact: end of year 2 (in %).

Survey item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel that the SPIs helped to improve my communication and patient interviewing skills.	11.76	0	0	35.29	52.94
I feel more comfortable interviewing real patients as a result of the SPIs.	11.76	0	5.88	52.94	29.41
I feel better prepared to complete my first CPA with a standardized patient in Year 3 as a result of the SPIs.	11.76	0	5.88	35.29	47.06

many participants indicated that their docents played a vital role in the opportunity to view, critique, and test their skills. One participant noted:

> *When I sat down with my docent doctor after each interview, we would mostly discuss communication issues, rather than the relevance of the medical questions I asked. He would point out nervous habits, closed-off body language, the overuse of filler words like "um," and awkward transitions between the sections of the patient history. By the last session, those quirks were almost gone and the interviews flowed much more naturally.*

Beyond simply being given the opportunity to exercise their communication and interviewing skills, participants further noted the importance of being able to repeatedly *practice* their developing skills. This led them to become more "at ease" with real and standardized patients, as well as with their own abilities, as one participant indicated, "Having the ability to practice really showed me areas of improvement." This ultimately allowed them to gain more confidence in themselves and their skills by the end of the year 2 SPI experience. As such, one participant commented that "I felt more at ease communicating with real patients. Practice interviews (thus) helped real interviews feel more like a conversation."

In general, participants indicated that the opportunity to practice interviewing better prepared them for their first CPA. A large number of them further noted that they were actually unfamiliar with or were even completely unaware of the required year 3 CPA assessment criteria prior to participating in the intervention. It was their participation and relative input of their docents that allowed them to gain important knowledge of the CPA's logistics and assessment style. The practice allowed participants to feel more confident in themselves and their skills and further develop perceived advantage (over their peers) during their initial year 3 CPA. This boost in confidence and a perceived advantage allowed them to feel better prepared to complete their first CPA with a standardized patient in year 3. One participant's remarks summarize the sentiments quite well:

> *Not only did we get a chance to actually conduct interviews in the space where we will be evaluated next year (so we had the opportunity to be acclimated to it, in a sense) but we also got to learn how we will be evaluated and the key aspects our evaluators will be looking for. Furthermore, we've had chances to practice interviewing in this way and I definitely feel better about CPA now than if I was going in without having had this experience.*

Following their students' completion of all four rounds of year 2 SPIs, 100% of the participating docents felt that SPIs had helped to improve their students' communication skills and effectiveness in interviewing patients (see Table 4).

Much like responses from the students' survey, comments from the docents' survey corroborated their quantitative responses. Docents felt that the SPIs had "helped to improve" their students' skills, made their students "feel more comfortable" with "real patients," and were overall "beneficial" to students prior to their initial year 3 CPA. Overall, the docents responded that students' ability to "see themselves" on video, receive "feedback," "practice," and become more "comfortable" and "self-aware" allowed their students to become more "thorough" and "confident" for the forthcoming year 3 CPA.

Many of the participating docents felt that the students' ability to *view* themselves during the video

Table 4. Docent perceptions of students' participation in SPIs (in %).

Survey item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No response
I feel that the SPIs helped to improve my students' communication and patient interviewing skills.	0	0	0	57.14	42.86	N/A
I feel that my students seemed more comfortable interviewing real patients as a result of SPIs.	0	0	0	57.14	28.57	14.29
I feel that SPIs were beneficial for my students.	0	0	0	42.86	57.14	N/A
I feel that the time required of me to have my students participate in the SPIs was acceptable.	0	0	14.29	42.86	14.29	28.57
I feel that SPIs should be made available to all year 2 students	0	0	0	28.57	57.14	14.29

Table 5. Students' perceived impact of exposure to SPIs after completing year 3 CPA (%).

Survey item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel that the year 2 SPIs helped to improve my communication and patient interviewing skills.	0	0	7.14	21.43	71.43
I feel more comfortable interviewing real patients as a result of the year 2 SPIs.	0	7.14	7.14	28.57	57.14
I feel that my experience with standardized patients in year 2 prepared me to perform better on my initial year 3 CPA with a standardized patient.	0	7.14	42.86	28.57	21.43

recorded SPIs was a key tool in not only improving students' communication and patient interviewing skills but also increasing their awareness of their own body language. One docent noted that, as her students continually reviewed their own SPI videos, they "… became aware of their non-verbal communication, as well as the verbal interactions." Likewise, another docent stated that giving her students the ability to "see (their) non-verbal communication/body language" while receiving docent feedback "improved (the students') confidence."

All participating docents also reported that their students seemed more comfortable interviewing real patients as a result of early exposure to SPIs. Furthermore, several docents also noted that their students became more "efficient" and "organized" in their interviewing skills as a result of the practice provided during the SPIs. One docent summarized well the majority of the docents' comments:

> *The extra practice bolsters confidence. Students who took part in the study were obviously more comfortable interacting with real patients. They also missed fewer parts of the history and were more efficient with their time.*

Given the overall positive response from the participating docents, it was not surprising to discover that the docents were all in agreement that SPIs were beneficial for their students. Echoing the sentiments of her fellow docents, one docent explained that, "One of the most beneficial parts of the study was the opportunity for the students to see themselves and reflect on what they did well and where they needed improvement."

Participating students' responses within the *year 3* survey were overall very positive. As shown in Table 5, over 92% indicated that they felt the year 2 SPIs helped to improve their communication and patient-interviewing skills. Roughly, 85% expressed that they felt more comfortable interviewing real patients as a result of the year 2 SPIs. Qualitative comments echoed the same sentiments as those depicted in the *End of Year 2* survey with regards to the perceived impact on exposure to SPIs in year 2 on communication skills. One sentiment that was emphasized more in the *year 3* survey was the role of docents' feedback in refining participants' communication skills. Students noted that the practice complemented by the docents' review allowed them to more easily identify their own weaknesses and areas of improvement when actually conducting their year 3 CPA. This ultimately allowed participants to develop a sense of self-awareness needed to "hone" their interviewing skills and more easily recognize how to "properly" conduct a patient-centered interview. One participant noted:

> *The constructive criticism from my docents and the standardized patients along with the video recording of myself helped me understand my strengths and weaknesses with patient communication. Once I realized what my strengths were, it greatly improved my confidence and comfort with doing patient interviews. My docent was able to work with me to help me phrase certain difficult parts of the interview she noticed I was struggling with, and by the end of the study, I feel that my communication was significantly improved.*

A new theme that emerged from the *year 3* survey is the role SPIs played in making up for a lack of patient interviewing in their required docent meetings. Although a number of students shared this sentiment, one student summed their thoughts well:

> *My year 1–2 docent did not offer too many opportunities for direct 1:1 interviewing; beyond that it was impossible for him to give each of us feedback on those interview skills and it is even more impossible for us to get patient feedback. All of this was made possible by the standardized patient interviews and it really helped me hone in on my skills and identify areas that I needed to improve.*

Despite the fact that the intervention group outperformed the control group on various components of year 3 CPA, as reported earlier, and the overall positive ratings and comments about the

SPIs, only 50% of the respondents indicated that they felt that their experience with standardized patients in year 2 ultimately prepared them to perform better on their initial year 3 CPA with standardized patients. Qualitative comments provided further explanation for this overall response as more than half of the participants agreed that year 3 CPA was too *different* from the SPIs of this study. Specifically, participants noted that the CPA grading criteria, and thus the expectations of how they were to perform during year 3 CPA, did not reflect the specific skills they had learned, and for which they were given docent feedback during the SPIs. Comments from one participant summarize the thoughts and feelings of fellow participants:

> *Participating in the study without a doubt helped improve the thoroughness of my patient interviews, but I do not feel that it greatly improved my performance on the CPA pretest. This is because the CPA assessed different qualities than the study. For example, the study focused on including all the different components of the history (e.g., Family history, Social history, Sexual history, Review of Systems) however, the CPA focused on whether or not we asked the specific questions, stated specific phrases, etc. listed in their rubric... While I believe the study helped improve my demeanor and helped prepare me for clinic, I do not think it prepared me to do well on the first CPA.*

Other participants indicated that too much time had spanned between the SPIs of this study and their initial year 3 CPA (a period that included students' summer vacation):

> *I find the study to be a positive experience for me, but I do find that with the time gap between docent, the year 2 experiment, and my year 3 CPA there may have been some skill lost. This time gap caused me to lose some constructive feedback that could have improved my interviewing skills as well as the gap caused [me] to feel unprepared yet again.*

Despite this critique from the students, 100% of the participating docents maintained that SPIs should be made available to all year 2 pre-clinical students. Indeed, several docents suggested that SPIs should be included as a standard portion of the of year 2 docent experience. Many docents even suggested replacing a portion of the students' regularly scheduled docent time with SPIs. As justified by one docent, the SPIs help students "develop good habits early on by giving direct feedback ONE on ONE."

Discussion

Research suggests that SPIs are essential for teaching and assessing communication skills during medical school and, ultimately, for ensuring that future physicians are effective communicators [6,23,26]. Unfortunately, however, available research is ambiguous regarding the use of SPIs in the curriculum of pre-clinical students, and even less clear regarding their use with younger medical students such as those in non-traditional accelerated/combined BA/MD programs in the United States. In response to this gap in literature, our study investigated whether participation in formative SPIs during the pre-clinical year 2 of an accelerated BA/MD 6-year program would improve students' communication skills by year 3. Additionally, our study explored students' personal experiences and self-perceptions of their participation in formative SPIs, as well as perceived impact of this participation on their overall communication and interpersonal skills.

The first set of findings of this study confirmed our hypothesis that participation in formative SPIs during year 2 improves students' communication skills in the year 3 CPA. Participants in the intervention group scored significantly higher than their counterparts in the control group on three out of the four sub-categories of CPA. Patterns of improvement or decline between the intervention and the control groups over time showed that participants in the intervention group maintained a relatively constant lead over their counterparts in the control group over the three successive CPAs. This finding is consistent with what previous research has unveiled. For example, a study by Colletti et al. [27] found that medical students who were given an opportunity to practice breaking the bad news with standardized patients scored significantly higher on communications skills than those who did not undertake the experience. In a related study by Johnson and Kopp [28], first-year dental students who were taught record keeping, physical examination, and communication skills using standardized patients scored significantly higher on all three areas than second-year students, who only had experience of consulting with real patients. Another study with three medical schools in China revealed that students who were introduced to a new curriculum, where standardized patients were adopted for teaching interviewing skills and history-taking skills, performed significantly better than those who followed the old curriculum that did not have standardized patients [29]. Overall, in light of

enormous variability in the modalities of SPI programs among medical schools specifically regarding when SPIs should be introduced to students, findings from this study suggest that the earlier students are introduced to SPIs, the better equipped they become with communication and interpersonal skills as they progress in their curriculum.

It was interesting to note that participants in both the intervention and the control groups performed worse on the history-taking component of the third CPA than they did in the second CPA, although the decrease in scores was slightly worse for the control group than the intervention group. Our assumption is that the students emphasized preparing for and performing the physical exam portion of this CPA (as it was "new" to them), at the expense of the history component.

Findings from the surveys, both quantitative and qualitative, revealed that respondents in the intervention group largely felt that SPIs helped to improve their communication and interviewing skills and made them feel more comfortable and better prepared for their upcoming year 3 CPA. Likewise, all participating docents agreed that SPIs helped to improve their students' communication skills and effectiveness in interviewing patients. Student participants reflected that the year 2 SPIs allowed them to learn more about themselves as interviewers by revealing their own strengths, weaknesses, and personal "styles" in patient interviewing. This allowed them to improve upon their skill-sets as interviewers and develop a sense of how each of them is able to best carry out a "proper" patient-centered interview. Ultimately, a majority of students felt that exposure to SPIs allowed them to become more comfortable with real patients and better prepared for their initial year 3 CPA. Results from the surveys are consistent with findings from most studies that have investigated perceived impact of SPIs on communication skills using self-reports. May et al. [30] conducted a meta-analysis of such studies and found a discernable trend of a perceived positive value of the SPIs on teaching and assessing communication skills. Given their perceived value, it was not surprising that, consistent with recommendations from prior studies [31], participating docents recommended early adoption of SPIs into the curriculum.

A notable methodological strength of our study is that, unlike most studies that solely relied on self-reports [30], we utilized a mixed methods research design. A mixed methods approach provided multiple perspectives from which to obtain a more holistic understanding of the impact of early exposure to SPIs on students' communication skills. The quantitative quasi-experimental method explored the effects of our intervention, whereas qualitative comments in the survey explored participants' experiences of the intervention, as well as its perceived impact on their communication skills. Furthermore, soliciting self-perceptions of the impact of SPIs on students' communication skills from both students and docents added validity to our findings.

Another methodological strength of our study is that our post-intervention measures entailed three different CPA encounters, which were conducted throughout the first 6 months of year 3. As Gillette et al. [32] submits, most studies that have investigated the impact of SPIs on communication skills were conducted over exceedingly short time periods, some as little as 2 days. As Rickles et al. [33] further reiterates, very few studies have evaluated the use of SPIs in improving student learning of communication skills over the course of a semester. Additionally, the fact that students in the intervention and the control groups were homogeneous demographically, as well as in prior academic performance strengthened the quasi-experimental phase of our study by mitigating possible effects of confounding factors.

In conclusion, findings of this study confirm our hypothesis that participation in formative SPIs during the pre-clinical second year of an accelerated BA/MD 6-year program improves students' communication and patient interviewing skills in year 3. Furthermore, this study shows that early participation in SPIs enhances the students' comfort level and skills in interviewing "real" patients, as evidenced by survey responses from participating students and docents.

Limitations

While this study confirms our hypothesis, we recognize a few limitations to this study. First, this study only used the first three successive CPAs taken during the first 6 months of students' year 3 to determine whether students' participation in formative SPI's in pre-clinical year 2 would improve their communication skills. Although findings showed a general lead in scores for participants in the intervention group as compared to their counterparts in the control group, a determination of improvement of performance over time could be more robust if their scores were compared for a

relatively more protracted time, i.e., as students progressed to years 4 and 5.

A methodological limitation for our study lies with our sample size, which limits the generalizability of our findings. Only 23 students were recruited to participate in the intervention because of the scarcity of SPI resources above and beyond the resources traditionally reserved for years 3–5 students, as stated earlier.

Also, many participating docents noted barriers to completing video reviews of SPIs with their participating students, including time commitment, scheduling difficulties, and technology issues. Technology issues were primarily due to the difficulty of securely transmitting and remotely downloading/viewing SPI videos recorded on specialized, proprietary software. Therefore, SPI videos should be recorded on software that can be easily transmitted through a secure server and the videos should be easily downloadable and viewable by a variety of operating systems.

Implications

Despite its limitations, this study has important implications in the use of SPIs for teaching and assessing communication skills in younger, preclinical medical students. Results of this study suggest that earlier implementation of pre-clinical SPIs provides valuable formative assessment to students on their communication and patient interviewing skills and prepares students for future standardized patients and "real" patient encounters.

The shown confirmation of our hypothesis, as well as the participants' positive reflections on SPIs, is anticipated to prompt the future expanded use of standardized patients earlier in the pre-clinical years of medical schools, especially those with accelerated BA/MD programs, in the United States and elsewhere.

Based on the experience of this study's investigators and participating students and docents, resources will need to be dedicated to such an expanded use of standardized patients in order to overcome obstacles of time commitment, scheduling difficulties, SPI-related costs, and technology issues.

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Conflict of Interests

The authors declare that they have no conflict of interest.

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