Self-Efficacy Assessment: Nurse Practitioner Students in a Standardized Patient Simulation

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Abstact

Background: This study investigated self-efficacy among students who participated in a standardized patient simulation.

Methods: The design was descriptive research, using 14 acute care nurse practitioner students. Students evaluated their own perceived self-efficacy during three points of the study.

Results/Findings: The overall ANOVA indicated significant differences in the mean scores related to self-efficacy in history taking ($F(1.3,17.0) = 4.38$, $p = .04$) but no significant differences related to physical examination ($F(2,26) = 1.77$, $p = .19$) or overall self-efficacy ($F(1.4,17.8) = 3.59$, $p = .06$).

Conclusion: The results do not show a clear indication of growth in self-efficacy scores with nurse practitioner students. More research in this area is needed to determine if simulation changes self-efficacy.

A recent comprehensive review of literature related to high-fidelity patient simulation and nursing students self-efficacy pointed out that the biggest area of study in this area focuses on one type of simulation, high-fidelity simulation, and an extended review of the student's who were sampled in the studies revealed that few were nurse practitioner students (Leigh, 2008). Furthermore, in reviewing studies related to self-efficacy and nursing students, there is a lack of consensus and contradictory research findings as to whether teaching with simulation increases a students' self-efficacy (Feingold, Calaluce and Kallen, 2004; Schoening, Sittner and Todd, 2006; Beyea, von Reyn and Slattery, 2007; Reilly and Spratt, 2007; Scherer, Bruce and Runkawatt, 2007; Smith and Roehrs, 2009). Leigh concluded,

> This review of literature revealed a limited amount of research related to nursing students' and new graduates' level of efficacy and the effect of HPS [human patient simulation]. A more extensive body of knowledge on increasing self-efficacy of nurses is essential. (p. 10)

Thus, not only are more studies related to self-efficacy with nursing student's indicated, the fact that few studies use nurse practitioner students and no study evaluates the self-efficacy of nurse practitioner students with standardized patients lends a substantial gap in the literature.

Background

For years nursing education has enjoyed the benefits and uses of simulation in both the undergraduate and graduate curriculums. Educators struggle with the question of how best to prepare competent clinicians, and the measurement of clinical skills performance historically has challenged nurse educators (Gibbons, et al., 2002; Ebbert and Connors, 2004). As Bramble (1994) pointed out,

> The nature of clinical opportunities does not allow for reproducible or even similar learning experiences; evaluating student performance may not be valid and reliable during faculty site visits. With a variety of clinical situations, some students miss formative feedback that would enhance cognitive and clinical performance. (p. 59).

For these reasons standardized patients have often been used to provide an outcome measure of students' clinical competence, to access faculty effectiveness in teaching, and to assess clinical decision making (Vessey and Huss, 2002).

Standardized patients were developed by Barrows (1993, p. 43) who describes this type of simulation as, "The umbrella term for both a simulated patient (a well person trained to simulate a patient's illness in a standardized way) and an actual patient (who is trained to present his or her own illness in a standardized way)." One area of nursing that has utilized standardized patients is nurse practitioner (NP) education. The research reports that standardized patients are used in nurse practitioner curriculums for summative and formative evaluation (Bramble, 1994, O'Connor, Albert and Thomas, 1999). Studies show that graduate faculty use standardized patient scenarios to evaluate assessment, communication, and knowledge development (O'Connor, Albert and Thomas, 1999; Vessey and Huss, 2002; Gibbons, et al., 2002; Ebbert and Connors, 2004). Cultural competency has been shown to increase with nurse practitioner students through the use of standardized patients (Rutledge, Garzon, Scott and Karlowicz, 2004). However, what is not known is whether clinical self-efficacy

changes among nurse practitioner students who participate in a standardized patient simulation prior to entering their first clinical rotation.

Theoretical Framework

The theoretical framework guiding this study is social cognitive theory. This adult learning theory explains how personalization and modeling are used to enhance the capabilities of learning. A major construct of this theory is self-efficacy. Self-efficacy according to Bandura (1994, 1997) is a person's belief or attitude regarding their capabilities to produce designated levels of performance to ascertain certain goals.

Literature Review

Bandura (1986, 2001) studied human adaptation and change which occurs through cognitive, vicarious, self-regulatory, and self-reflective processes. The theory is rooted in agentic perspective, meaning people are self-organizing, proactive, self-reflecting, and self-regulating. "Broadly speaking, agency is the capability of individual human beings to make choices and to act on these choices in ways that make a difference in their lives" (Martin, 2004, p. 135). Furthermore, it is a dynamic interplay between personal, behavioral, and environmental influences that affect human functioning. People are not just reactive organisms shaped and shepherded by environmental forces or driven by concealed inner impulses but producers as well as products of social systems.

One of the core features of human agency in social cognitive theory is the human ability to have intentionality and forethought (Bandura, 1986). This allows people to direct their own course of action as well as set goals and challenges for themselves. Based on the consequences of the course of action, people are then able to regulate their behavior and motivation. If the consequence of their action is felt in a positive light, then people will continue those actions. Perceived negative reactions will have the opposite effect and deter people from continuing those actions.

Bandura (2001) stated the following:

> People are not only agents of action but also self-examiners of their own functions. The metacognitive capability to reflect upon oneself and the adequacy of one's thoughts and actions is another distinctly core human feature of agency.

> Through reflective self-consciousness, people evaluate their motivation, values, and the meaning of their life pursuits. (p. 10)

Social cognitive theory contends that the idea of self-efficacy, or the belief that one is capable of performing in a certain manner to attain certain goals, is the foundation of human agency. "Unless people believe they can produce desired results and forestall detrimental ones by their actions, they have little incentive to act or to persevere in the face of difficulties" (Bandura, 2001, p. 10). Self-efficacy dictates many facets of life- thinking, motivation, vulnerability, and decision-making.

Self-efficacy may be increased in students who participate in simulated learning. However, the literature pertaining to self-efficacy and nursing students is limited, and the research findings are often contradictory as to effect of simulation on nursing student's self-efficacy. In research based on Bandura's (1977, 1986) theory of self-efficacy, Sinclair and Ferguson (2009) results indicate that undergraduate students' self-confidence in learning was higher when exposed to lecture and simulation versus lecture alone. Similarly, Kameg, Howard, Clochesy, Mitchell, and Suresky (2010) found that undergraduate student's self-efficacy in communication skills increased following a simulated patient experience. Other studies have shown increases in the self-efficacy of registered nurses who participate in simulation (Wolf, 2008).

Purpose

There is little research that addresses the self-efficacy of nurse practitioner students who participate in simulations involving standardized patients. Therefore, this study examined if nurse practitioner students who participate in a simulation experience with standardized patients prior to entering their first clinical rotation showed increases in perceived self-efficacy. Guiding this study was the following question: Does clinical self-efficacy change among students who participate in a standardized patient simulation?

Methodology

Design

The study used a descriptive research design with a small sample of nurse practitioner students who participated in a standardized patient simulation. Students evaluated their own perceived self-efficacy at three points during the study (prior to the

simulation, after the simulation, and prior to seeing the first patient in the clinical setting).

Setting and Sample

The setting for this study was a large private university in the Midwest United States. A convenience sample of acute care nurse practitioner students were recruited. The single sample group consisted of 14 graduate acute care nurse practitioner students who were entering their first semester of clinical courses. Student participants were solicited to voluntarily participate on the day of the simulation experience before the encounter with the standardized patient. The Northern Illinois University Institutional Review Board (IRB) approved all forms and procedures prior to the start of this study.

Pilot Test

The entire study procedure, including administration of the developed instrument, was pilot tested with one nurse practitioner student. The pilot test was conducted prior to any actual data collection. Following the pilot test, the instrument was adapted accordingly, based upon the results.

Data Collection

Data were collected in the Fall semester 2010. Demographic data were collected on student participants for the purpose of analysis and comparison. The Nurse Practitioner Student Self-Efficacy Assessment in History Taking and Physical Examination tool was developed by the researcher using guidelines outlined by Bandura (2006). Items on the self-efficacy tool were taken from 1) the nurse practitioner course which teaches students how to obtain a health history and perform a physical examination, and 2) textbooks that speak directly to obtaining health histories and performing physical examinations. The researcher completed a literature search on self-efficacy tools that recently have been used in nursing research. This gave the researcher information on the correct self-efficacy scale to use in the tool. Finally, the researcher shared this tool with a nursing colleague with expertise in this content. The colleague evaluated the tool for inclusiveness and accuracy, providing additional validity evidence for the tool.

The Nurse Practitioner Student Self-Efficacy Assessment in History Taking and Physical Examination tool was divided into two subscales. The first part of the tool

asked each student how confident he or she was in obtaining items of a health history. The items in this category comprised the first subscale, Health History (HH). The second part of the Nurse Practitioner Student Self-Efficacy Assessment in History Taking and Physical Examination tool asked each student how confident he or she was in performing a physical examination. The items in this category comprised the second subscale, Physical Examination (PE) and included all the systems in a physical examination.

Students completed the Nurse Practitioner Student Self-Efficacy Assessment in History Taking and Physical Examination tool at three times during the study. The first (Time 1) was completed on the day of the simulation experience prior to the standardized patient exercise. The second (Time 2) was completed on the day of the simulation experience after the completion of the standardized patient exercise, and the final (Time 3) was completed in the clinical setting after the encounter with the first patient in the clinical setting.

Results

The age of participants ranged from 25 years to 56 years, with the average age of 35 years. Four males and 10 females participated. Computed values of coefficient alpha showed good reliability evidence for the self-efficacy scores from each subscale and the overall score at each of the three administrations of the instrument (Time 1, Time 2 and Time 3). Reliability (α) of self-efficacy scores by subscale ranged from .92 - .98. Table 1 summarizes the descriptive statistics for the self-efficacy scores of the participants by subscale and overall, for the three administrations of the instrument (Time 1, Time 2, and Time 3). At the sample level, the mean values increased each time the instrument was administered. When skewness statistics for the growth in self-efficacy were computed, significant skewness was evident for the PE scale growth scores.

Table 1. Descriptive Statistics for Self-Efficacy Scores

	Time 1				Time 2				Time 3			
Subscale	*n*	*M*	*Md*	*SD*	*n*	*M*	*Md*	*SD*	*n*	*M*	*Md*	*SD*
HH	14	2.96	3.00	0.47	14	3.05	3.00	0.33	14	3.31	3.12	0.40
PE	14	2.69	2.80	0.37	14	2.77	2.80	0.51	14	2.92	2.87	0.48
Overall	14	2.83	2.90	0.39	14	2.91	2.90	0.35	14	3.12	3.02	0.35

Self-Efficacy Health History

To address the change in self-efficacy, repeated-measures analysis of variances (ANOVA) was carried out, where the three administrations of the self-efficacy instrument served as the three levels of the within-subjects factor, and the self-efficacy scores served as the dependent variable. When the Health History subscale was considered, Mauchly's test indicated that the sphericity assumption was violated ($\chi^2(2) = 9.12, p = .01$). The overall ANOVA (using the Greenhouse-Geisser adjusted test statistic) suggested significant differences in the mean scores across time ($F(1.3,17.0) = 4.38, p = .04$) with a large effect size ($r = .50$; see Table 2). A polynomial contrast indicated significant linear growth in the scores ($F(1,13) = 4.99$, $p=.04$), and effect sizes were moderate ($d = .30$ and $d = .37$ for the growth from Time 1 to Time 2, and Time 2 to Time 3, respectively).

Table 2. ANOVA Results for Health History Self-Efficacy Scores by Time

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	0.922	2	0.461	4.375	.023
	Greenhouse-Geisser	0.922	1.305	0.707	4.375	.043
	Huynh-Feldt	0.922	1.391	0.663	4.375	.040
	Lower-bound	0.922	1.000	0.922	4.375	.057
Error (Time)	Sphericity Assumed	2.741	26	0.105		
	Greenhouse-Geisser	2.741	16.968	0.162		
	Huynh-Feldt	2.741	18.089	0.152		
	Lower-bound	2.741	13.000	0.211		

Self-Efficacy Physical Examination

When the Physical Examination subscale was considered, Mauchly's test indicated that the sphericity assumption was not violated **(** $\chi^2(2) = 4.87, p = .09$**)**. The overall ANOVA indicated there were no significant differences in the mean scores

across time ($F(2,26) = 1.77, p = .19$) but with a moderate effect size ($r = .35$; see Table 3).

Table 3. ANOVA Results for Physical Examination Self-Efficacy Scores by Time

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	0.387	2	0.194	1.770	.190
	Greenhouse-Geisser	0.387	1.500	0.258	1.770	.200
	Huynh-Feldt	0.387	1.652	0.234	1.770	.197
	Lower-bound	0.387	1.000	0.387	1.770	.206
Error(time)	Sphericity Assumed	2.842	26	0.109		
	Greenhouse-Geisser	2.842	19.495	0.146		
	Huynh-Feldt	2.842	21.471	0.132		
	Lower-bound	2.842	13.000	0.219		

Because the growth scores for physical examination were significantly skewed, a non-parametric test was additionally computed. Friedman's test confirmed the prior results which indicated there was no significant growth over time ($\chi^2(2) = 2.59, p = 27$), but there was again a moderate effect size (r = .43).

Self-Efficacy Overall

When overall self-efficacy was considered, Mauchly's test indicated that the sphericity assumption was violated ($\chi^2(2) = 7.43, p = .02$). The overall ANOVA (using the Greenhouse-Geisser adjusted test statistic) suggested the mean scores did not change significantly across time, although the effect was close to significant ($F(1.4,17.8) = 3.59, p = .06$; see Table 4). The effect size was moderate ($r = .47$). Figure 1 shows a plot of the mean values.

Table 4. ANOVA Results for Overall Self-Efficacy Scores by Time

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	.624	2	.312	3.585	.042
	Greenhouse-Geisser	.624	1.368	.456	3.585	.064
	Huynh-Feldt	.624	1.475	.423	3.585	.059
	Lower-bound	.624	1.000	.624	3.585	.081
Error(time)	Sphericity Assumed	2.263	26	.087		
	Greenhouse-Geisser	2.263	17.789	.127		
	Huynh-Feldt	2.263	19.176	.118		
	Lower-bound	2.263	13.000	.174		

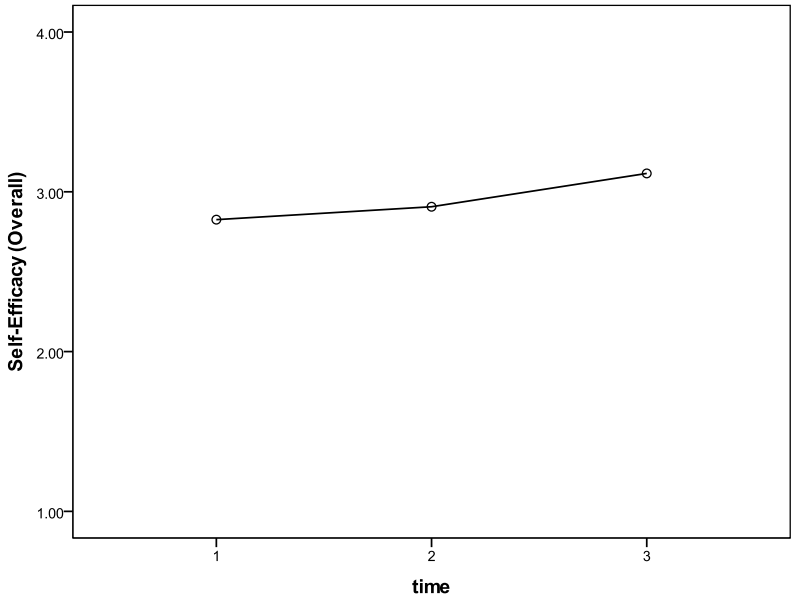

Figure 1. Mean overall self-efficacy by time

Discussion

Limitations

There are several limitations of this study. First, the student participants studied were all located geographically within one area from one university setting. The participants were also in a select nurse practitioner program, thus not all nurse practitioner programs were represented.

Exploring New Horizons

This study investigated the following question, "Does clinical self-efficacy change among students who participate in a standardized patient simulation?" This study indicated linear growth in self-efficacy over time among the students who participated in a standardized patient simulation. There were statistically significant differences in the mean health history self-efficacy scores over time (i.e., during the three administrations of the self-efficacy instrument). However, there was no significant change in the mean physical examination self-efficacy scores over time, and the change in overall self-efficacy score by time was not statistically significant.

No study has investigated the self-efficacy of nurse practitioner students as it relates to standardized patients and simulation. Furthermore, as previously stated, the literature is contradictory on whether self-efficacy increases with undergraduate nursing students who participate in simulation (Beyea et al., 2007; Feingold et al., 2004; Reilly & Spratt, 2007; Scherer et al., 2007; Schoening et al., 2006; Smith & Roehrs, 2009). The results from this study are congruent with the literature that exists in that they do not show a clear indication of growth in self-efficacy scores with nurse practitioner students. While self-efficacy increased over time, it only occurred for self-efficacy in assessing health history. Students' self-efficacy scores did not increase significantly for either self-efficacy in physical examination or self-efficacy overall.

Why would students indicate a sense of growth in self-efficacy when assessing health history but not when performing a physical examination? The explanation may be in part due to the fact that the sample consisted of registered nurses. As nurses the students would already perform physical examinations on patients. However, as nurse practitioners, the students will often do a more thorough and advanced physical examination, but the case study portrayed by the standardized patient did not call for this. Therefore, the students were able to complete a physical examination similar to one they would perform in everyday practice. For this reason, students' self-efficacy may not have substantially changed from Time 1 to Time 2. And, if the patient seen in the clinical setting also did not require a more thorough physical examination but rather one similar to what the student would perform in his or her role as a registered nurse, then there may not have been significant changes in the student's self-efficacy related

to physical examination from Time 2 to Time 3. Considering the student completed the third administration of the self-efficacy tool on their first day of clinical, this is very reasonable. It is not common for students to be assigned a highly complex patient as the first patient they examine on the first day of clinical in their first rotation.

On the other hand, obtaining a health history on a patient is a more complex skill that generally nurses do not complete, or at least not in the entirety that a nurse practitioner may be expected to do. As previously discussed, a nurse may be comfortable with certain pieces of the health history, but it is not likely that nurses would obtain a complete or focused health history as a nurse practitioner would. Therefore, students might have more change in their self-efficacy related to obtaining a health history. After completing the simulation experience where the student obtained a health history on the standardized patient, he or she may have felt more (or less) confident in their ability to perform the new task (Time 2). Then after performing the skill again in the clinical setting, the student's perceived self-efficacy again could significantly increase or decrease (Time 3). In this study students indicated increased confidence in obtaining a health history during the three administrations of the tool. There was significant growth from Time 1 to Time 2, and from Time 2 to Time 3.

Another explanation for the findings in research question 2 may have to do with the characteristics of the students. The admission requirements for students to be accepted into the acute care nurse practitioner program at the school used in this study are strenuous. Students must have a minimum of 2000 clinical hours as an acute care nurse. Students must also have successfully obtained licensure as a Critical Care Registered Nurse (CCRN). Established by the American Association of Critical Care Nurses (AACN) (2010), the organization states the following:

> Through an extensive review and evaluation process, the knowledge, skills and abilities crucial to critical care nursing were defined using the AACN Synergy Model for Patient Care as an organizing framework. CCRN certification exams are based on these skills and abilities and the knowledge required to perform them. CCRN (sic) certification is achieved by those acute and critical care nurses who pass a CCRN exam in neonatal, pediatric and/or adult critical care nursing. CCRN certification denotes to the public those practitioners who

possess a distinct and clearly defined body of knowledge called critical care nursing.

Therefore, the self-efficacy levels of these students may have been high at the onset of the study, and while their mean self-efficacy scores increased in all areas, they did not increase to the point of being statistically significant overall or in the physical examination.

Another reason why students' self-efficacy scores did not increase for either self-efficacy in physical examination of self-efficacy overall may be due to a ceiling effect. A ceiling effect can occur in data-gathering when a variable is not measured above a certain level. When this happens, there is a "bunching" of scores at the upper level reported by an instrument. In this study there may have been a ceiling effect in the tool, Nurse Practitioner Student Self-Efficacy Assessment in History Taking and Physical Examination, in which case the differences in self-efficacy scores during the three administrations of the self-efficacy tool were not reflected.

Finally, there may be other explanations for the findings of research question four. Perhaps there were issues with the teaching methods in the simulation itself that manifested the results. One of the critiques of problem-based learning, such as the contextual factors and lack of control by the student in the environment, could have merit in the findings to this research question (Fenwick, 1998).

Conclusions

This study could be replicated. In doing so, a larger sample size may be advantageous in that the findings may be more representative of the population. A replicated study could include a control group in order to gain a better understanding of the effect of the simulation with a standardized patient on student's self-efficacy. Also, a few changes in the instrument used may illicit further insight into why the growth did or did not occur in self-efficacy from the simulation lab to the clinical setting. For example, much of the conjecture around the findings from this study had to do with what the students do in their current professional role as a registered nurse. Distributing a questionnaire to students at the beginning of the study, to find out what they already do in their role as a nurse, might provide greater insight into these findings and speculations.

This study uses the theoretical framework of social cognitive learning and self-efficacy in a different context than previously reported. It contributes to the literature that currently exists by testing it with simulation in nursing education- an area where self-efficacy has not been studied.

This study expands existing findings in the area of simulation efficacy and provides guidance for program administrators and instructors regarding appropriateness, accuracy and acceptability of simulated experiences in nurse practitioner education. The results can contribute to an understanding of effective instructional methods and provide guidance to faculty using simulation technology. Finally, data inform the understanding of standardized patient use on skill development prior to nurse practitioner students' first clinical rotation, thus, supporting both process and program improvement.

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