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Achievement Orientation and its Relationship to Senior Nursing Students' Performance

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Abstract

Background: The complexities of today's health care system, coupled with initiatives designed to improve the quality and safety of care, demand a level of expertise in nursing practice that greatly exceeds past requirements. Nursing programs need to redesign instruction to maximize learning. The Expert Performance Approach (EPA), with its focus on maximizing performance, offers an ideal framework to guide nursing education. Within the EPA, it is hypothesized that individuals are capable of improving performance with appropriate deliberate practice activities if they are motivated to engage in the required practice activities Motivation and achievement are critical to academic success and fundamentally linked to one another.

Purpose: The purpose of this study was to examine the relationship among goal orientation, performance on standardized testing, and clinical performance in high fidelity simulation scenarios in a group of senior nursing students.

Methods: Twenty six senior nursing students in their last semester of an upper division four semester program volunteered to participate. Measures included scores from a standardized end of program exam, nursing specific and science grade point averages, scores from two measures of achievement motivation, and analysis of performance in a high fidelity simulation environment using physiologic variables.

Results: There were 22 females and 4 males, including 18 White (69.2%), 4 African American (15.3%), and 4 Hispanic (15.3%) participants. The mean score on the achievement motivation scale for the higher performing group was 12.75 (SD 1.42) while the mean score for the lower performing group was 10.43 (SD 2.03) ($t=3.323$, $P< .05$). The second scale measured motivation related constructs that pertained directly to learning related activities. The mean score on the scale for the higher performing group was 263.33 (SD 15.25) and the mean score for the lower performing group was 239.21 (SD 24.17) ($t=2.981$, $P< .05$). And finally, there was a uniform trend towards higher performance on both of the motivation scales by participants who were able to manage the physiologic stability of the Human Patient Simulator more effectively.

Discussion and conclusions: Motivation was examined within the context of achievement goal theory and its relationship to clinical performance using clinical scenarios in a high fidelity simulated task environment. Findings revealed a consistent trend toward higher scores on both motivation scales in participants who were more effective in stabilizing their patients. These findings appear to be some of the first evidence tying motivation within the context of achievement goal theory to clinical performance measured in a high fidelity task environment.

Keywords: Academic performance; Achievement orientation; Clinical performance; Simulation; Nursing students

Introduction

In 2010, the Institute of Medicine [1] released a report that highlighted the inadequacies of nursing educational systems for preparing nurses for practice in the highly complex environment of the current century. Traditional educational approaches tend to attribute individual differences to cognitive ability as evidenced by the weight given to grade point averages (GPA) and standardized achievement test scores in admission criteria [2,3]. While valuable, these metrics do not reflect all aspects of high-level performance. The Expert Performance Approach (EPA), with its focus on maximizing performance, offers insight into this dilemma.

The EPA with its emphasis on deliberate practice has become a valuable instructional approach in health sciences education [4]. Previous research on expert performance suggests that individuals are capable of improving performance with appropriate deliberate practice activities if they are motivated to engage in the required practice activities. It is based on the assumption that improvement in performance is not an automatic consequence of additional experience. Motivation is a key construct in Ericsson's work [5-7].

In health sciences education, the EPA is often used in conjunction with simulated task environments that can approximate complex, ill-structured situations like those health care professionals find themselves in on a daily basis [8,9]. In addition to suitable learning conditions, achievement requires motivation [10,9,5]. Ericsson et al. [5] identified motivation as a pre-condition for deliberate practice. Motivation and achievement are critical to academic success and fundamentally linked to one another [7,11,12]. The present study examined the relationship among goal orientation, academic performance, and clinical performance in a simulated task environment in a group of senior baccalaureate nursing students attending a four-semester upper division traditional baccalaureate program. The investigators hypothesized that individuals with high achievement orientation and with higher academic performance scores would perform better when engaged in scenarios in a simulated task environment.

In general, motivational theories focus on explaining goal-directed activity [13]. Achievement Goal Theory (AGT), a major achievement motivation theory [14], is based on a social-cognitive view of motivation particularly associated with the development of competence [12]. It focuses on the individual student's reasons for engagement in and persistence at specific learning activities. Goal orientation can be described according to mastery or performance orientation. Mastery orientation is associated with developing one's skills, while aspiring to understand and learn something challenging. The student perceives success as self-improvement and derives "… satisfaction from the inherent qualities of the task, such as its interest and challenge" (p490) [12]. In contrast, performance orientation is associated with striving to be better than others. The student is motivated to demonstrate that he/she performs better when compared to peers. Further revision of the AGT resulted in the separation of approach and avoidance striving and the particular importance of performance-approach in relation to mastery goals [15]. Evidence suggests performance- avoidance goals are associated with maladaptive outcomes whereas performance-approach goals are associated with better outcomes, particularly in relation to achievement [16,17].

Literature Review

There is a large body of literature on motivation and academic achievement [17,18], spanning decades and covering numerous theoretical approaches, however the present review focused on education in the health sciences, particularly medicine and nursing. The

Modified Archer's Health Professions Motivation Scale (MAHPMS) was used to examine goal orientation in medical students, nursing students, and pharmacy students [19]. The authors reported that 63% of the students were mastery oriented and those students were more likely to be 24 years of ageor older. More than 26% were performance oriented and more likely to be male, 8% were classified as alienated, and 3% did not demonstrate a preference. Nursing students showed a statistically significant use of metacognitive strategies to learn. Along with demonstrating the value of measuring goal orientation in students in the health sciences, the authors posited that mastery goal orientation is congruent with the goals of education in the health sciences. They concluded that mastery orientation is essential in professions in which knowledge changes rapidly and maintenance of professional competence is critical. Further, that "…professional education should help students develop skills that will not become obsolete" (p202) [19]. Salamonson et al. [20] used the Motivated Strategies for Learning Questionnaire (MSLQ) to explore self-regulating learning strategies in a group of first year medical and nursing students. The MSLQ measures three broad areas including value, expectancy, and affect.

Nursing students were significantly more extrinsic in their goal orientation while medical students were significantly different in their learning strategies including peer learning, help seeking, critical thinking, and time and study environment management. In addition, the grade point average (GPA) at the end of the first year was significantly different in favor of the medical students. It should be noted that there were significant differences in age with the nursing students being older, having a larger percentage of females, and more likely to be employed while being a student. While the authors concluded that their findings were important to consider in relation to interprofessional education (IPE), they also pointed out that the findings suggesta possible negative impact of working on academic performance. A different perspective on this finding might be that working may influence measures of motivation. Perhaps the significantly higher extrinsic goal orientation of the nursing students in this study that contrast with previous findings may be impacted by the need to work while going to school [19]. Medical and nursing students were also the focus of a study examining student motivation for knowledge acquisition [21]. Using focus groups, semi-structured questioning, and content analysis, the authors found self-motivation, teacher commitment, and discussion with other students important for learning. A difference was noted between student nurses who were focused on issues of assessment within the context of time constraints, while medical students who were more concerned with knowing what knowledge to focus on given the volume of knowledge they needed to learn.

Several studies conducted in medical education further understanding of the value of goal achievement theory in the health sciences. Madjar et al. [22] hypothesized that in a group of medical students, mastery goal orientation would be associated with positive psychosocial attributes, while performance goal orientation would be associated with low frustration tolerance (LFT) considered to be a negative attribute. The authors found that mastery goal orientation had a positive association with perceived psychosocial abilities and a negative association with LFT, while a significant association was found between performance goal orientation and LFT. A second study by Stegers-Jager et al. [23] examined factors associated with success and failure in medical students by considering the relationships among learning strategies, motivational beliefs, participation, and performance in school. The Dutch version of the MSLQ was used to measure learning strategies, motivational beliefs, and resource management. Participation was measured by three investigator – developed questions. The outcome measure, performance in year one, was determined by a GPA from all year one courses. Findings suggested that participation and self-efficacy beliefs were directly associated with 1st year academic performance, while deep learning strategies (often related to self- regulated learning) were negatively associated with 1st year performance. The authors proposed that only when deep learning strategies are combined with effective resource management and participation, can they result in academic success. However deep learning strategies had a positive correlation to values beliefs and the authors concluded that the relationship between motivation and performance is mediated by participation. Cook et al. [24] evaluated the validity of the MSLQ in a group of medical residents and concluded that the scores from the MSLQ were reliable and can predict meaningful outcomes. In addition, they suggested that the assessment of motivation can be used to improve learning. And finally, Artino et al. [25] examined the impact of motivational beliefs and emotions on achievement in a group of second year medical students. Using subscales of an online learning value and self-efficacy scale [26] to measure motivational beliefs (task value and self-efficacy), findings from the study demonstrated that motivational beliefs along with achievement emotions accounted for 20% of the variance in course grades and 14% of the variance on a standardized examination.

Investigations into the relationship of motivation to clinical skills or clinical performance has been sparse. Suksadaj et al. [27] studied the role of motivation in two cohorts of dental students' performance on a laboratory class procedure. A weak, but statistically significant association between performance and motivation as measured by questions on the Intrinsic Motivation Inventory (IMI) was reported. Another study investigating the role of deliberate practice in the acquisition of clinical skills identified factors that were contributory to higher scores on clinical skills performance [28]. These included planning, concentration/dedication, study style/ self- reflection. Planning and self-reflection have been associated with self-regulation which plays a role in achievement motivation [29].

Studies from the health sciences confirm the conceptual complexities of motivation as has been previously identified in the literature [3,11,30-34]. Also, the lack of a common measure of achievement motivation further complicates matters. Yet, studies consistently support a relationship between motivation within the context of achievement orientation and academic achievement as measured by grades. Given that the EPA identifies motivation as key to deliberate practice, the present study attempted to contribute to the knowledge on motivation in the context of EPA and tie both to clinical performance within the context of a simulated task environment.

Aim

The aim of the study was to examine the relationship among achievement orientation, performance on standardized exams, and clinical performance in a simulated task environment in a group of nursing students. Based on the literature, the investigators hypothesized that individuals with high achievement orientation, and with higher scores on their standardized exams, would perform better when placed in simulated task environment.

Methods

The study used a descriptive comparative design to examine the relationship among motivation, academic performance, and clinical performance in a simulated task environment.

Participants and setting

The participants were recruited from senior nursing students in the last semester of a baccalaureate program in a college of nursing at a large state university in the southeast United States. The program graduates on an average of 85 students each year. All of the participants had didactic and clinical training in critical care nursing. Out of the 85 students who were informed about the study, 26 volunteered to participate in the study.

The setting was a simulation laboratory that included a patient care suite that was configured and equipped like a typical room in a standard intensive care unit. A METICAE Healthcare™ ECS Human

Patient Simulator (HPS) adult model™ simulator was used to facilitate the simulations. The laboratory was configured with equipment that facilitated audio and video recording of different views in the room. This permitted recording of sufficient detail about each participant's actions and verbalizations in response to simulated scenarios to facilitate highly detailed coding.

The simulation protocol was comprised of four scenarios, each of which was five minutes in length. The scenarios required the participant to administer care to a patient with various degrees of cardiovascular and respiratory compromise and integrated the administration of vasoactive infusions. The scenarios were as follows: 1) A patient with sepsis and hypotension who is being treated with a dopamine infusion; 2) A patient being treated for atrial fibrillation with rapid ventricular response who is suffering a bout of tachycardia despite an infusion of diltiazem; 3) A patient with refractory hypotension and fluid volume contraction who is being treated with a norepinephrine infusion; 4) A patient being treated for a hypertensive emergency who is experiencing hypotension due to the administration of excessive sodium nitroprusside.

The scenarios were initially developed based on input comments from two nurses who were highly experienced and board certified in critical care nursing. The scenarios were trialed using three novice and three experienced nurses. Each of these participants provided comments regarding the scenarios, which was used to further refine the scenarios. Finally, piloted using three additional experienced nurses piloted the scenarios and also provided input on the scenarios.

Measures

1. The Ray-Lynn Achievement Motivation Inventory (AO) was used to measure basic achievement motivation [35-37]. The AO was developed based upon a social psychology framework due to the general unreliability of such instruments to date. The scale is short, containing a single inventory, with higher scores equilibrating to greater levels of achievement orientation. Ray initially validated the AO (1975) due to the lack of available measure. He examined several instruments thought to measure achievement motivation and found the AO to be the most reliable instrument ($p<.05$). Reliability for the 20- item instrument was satisfactory with a Cronbach's Alpha of 0.87 on successive samples. Further examination of the instrument by Lindgren et al. [38] found the measure to be most effective as a measure of sociological orientation that measures 'striving for status'. More recently, other researchers [39-41] have used the instrument with reliability comparable to those reported initially by Ray. It remains a widely used instrument.

2. The Motivated Strategies for Learning Questionnaire (MSLQ) was used to measure motivation related constructs that pertained directly to learning related activities [42]. The 44- item MSLQ was developed for use in a variety of college courses to determine, in part, the learning strategies undertaken by students trying to achieve success in their studies. The instrument measures three broad areas (value, expectancy, and affect) using a Likert scale from 1= not at all true of me, to 7= very true of me. Higher scores indicate higher levels of each characteristic as it relates to learning motivation. Initial testing of the subscales revealed alpha coefficients that ranged from 0.62 to 0.93 indicating strong reliability of the instrument across its scales. Confirmatory factor analysis was performed twice in order to establish the relative validity of the scales. Subsequently the scale has been used with medical students with Cronbach's Alpha of 0.97 [24] and with nursing and medical students to determine their learning strategies [43,23].

3. The Human Patient Simulator recorded physiologic parameters throughout the scenarios. The mean value of several of these variables was calculated based on the final 20 seconds of the post-test for each of the participants. This served as an outcome variable for the final phase of the analysis.

4. The Health Education Systems, Incorporated (HESI). HESI exams are a group of standardized exams that measure knowledge achievement in undergraduate nursing programs. The HESI E-2™, which is an end of program exam was a valid and reliable means of measuring the application of knowledge in this study.

5. Grade Point Average (GPA) was based on grades in nursing specific courses and science courses available in the participants' transcripts.

Ethical Considerations

Prior to initiation of the study, it was approved by the Institutional Review Board of the university (Institution Approval Number-2008.2069).The university is a tier one research university in the United States.

Data Collection

Data collection took place in the spring of 2012. The scenarios were administered in order (1, 2, 3, 4). Participants were initially oriented to the laboratory, and went through a series of exercises that required them to utilize the equipment and interact with the simulator. Participants were familiarized with the performance of verbal reports (Both concurrent and post hoc). Participants then completed a trial scenario prior to beginning the research scenarios.

Data Analysis

Key demographic variables are described in frequencies and percentages . Data analysis for the study focused on identifying key behaviors in the videos obtained during testing. Hierarchical linear regressions were also used to regress the general and nursing-specific academic performance metrics, including the Health Education Systems Incorporated (HESI) exam scores, on to the time at which participants titrated the vasoactive medication in each trial (the key action in the scenarios) (Table 1). Beta weights were used to show the relative contribution of each variable. Finally, for each scenario participants were assigned to high and low performing groups (Table 2) based upon participant ability to manage simulator physiology. An independent samples t-test was performed for each of the scenarios in order to discern any differences between the groups.

In order to classify the participants (N=26) the mean score for the exam was calculated (912), resulting in group composition of 12 high performing participants (i.e., above 912) and 14 lower performing participants (i.e., below 912). The maximum possible score on the exam was 1200. Having comprised two groups classified according to academic achievement, comparisons of the motivation related instruments were then undertaken.

Results

The sample was comprised of 26 participants who were senior nursing students in their last (fifth) semester of a baccalaureate nursing

Table 1: Summary of hierarchical regression analysis for variables predicting performance on the HESI E-2™ examination.

Variable	Model R	Model adjusted R [2]	B	SE B	β
Step 1					
Nursing GPA	0.574	0.302*	247.747	72.122	0.574*
Step 2					
Nursing GPA			206.307	69.116	0.478*
Ray –Lynn AO Scale total score	0.672	0.451**	13.807	6.108	0.362*

* $p<.05$, ** $p<.001$

Table 2: Comparison of scores based on clinical performance.

Scenario	Performance Criterion	High Performing Group score: Ray-Lynn 'AO' Scale	Low Performing Group score: Ray-Lynn 'AO' Scale	High Performing Group score: Learning Motivation Scale	Low Performing Group score: Learning Motivation Scale
1	High performing group assignment based on BP >100/50	N=13 12.54 (SD 1.16)	N=13 10.27 (SD 2.14) t-3.103*	N=13 261.54 (SD 11.19)	N=13 231.04 (SD 22.12) t=2.878*
2	High performing group assignment based on pulse less than 120	N=12 11.72 (SD 2.12)	N=14 9.91 (SD 2.31) t-2.153*	N=12 261.54 (SD 21.22)	N=14 224.01 (SD 31.26) t=2.347*
3	High performing group assignment based on BP >100/50	N=11 11.16 (SD 1.13)	N=15 10.43 (SD 1.44) t-1.041	N=11 253.67 (SD 16.28)	N=15 227.54 (SD 19.21) t=3.122*
4	High performing group assignment based on BP >100/50	N=14 12.53 (SD 1.422)	N=12 11.14 (SD 1.422) t-3.278*	N=14 259.09 (SD 21.22)	N=12 240.37 (SD 25.44) t=2.847*

* p<.05, ** p< .001

program. There were 22 females and 4 males, including 18 White (69.2%), 4 African American (15.3%), and 4 Hispanic (15.3%) participants. The mean age of participants was 22.8 (SD 1.24) years of age. The HESI E-2™ examination was part of the normal evaluation of all senior nursing students in the program.

The most basic instrument used in the study was the AO. Group comparisons were made in order to determine if differences were present between groups based upon the HESI E-2™ scores. The mean score on the scale for the higher performing group was 12.75 (SD 1.42) and the mean score for the lower performing group was 10.43 (SD 2.03) (t=3.323, p< .05). Additional consideration was given to the individual items where statistically significant comparisons were evident. The higher-lower performing group comparisons resulted in statistically significant findings, favoring superiority of the higher performing participants on items addressing: 1) valuing their comfort above 'getting ahead' (t=4.465, p<.001) 2) Always working hard to 'be your best' (t=2.469; p<.05) and 3) regarding the likelihood that an individual would experience a day in which they 'don't do a thing' (t=4.045, p<.001).

The second scale used in the study was the MSLQ. Again, group comparisons were made in order to determine if differences were present between groups based upon the HESI E-2™ scores. The mean score on the scale for the higher performing group was 263.33 (SD 15.25) and the mean score for the lower performing group was 239.21 (SD 24.17) (t=2.981, P< .05). As was the case with the AO, individual items were examined to determine the presence of statistically significant findings. The following item/topics were found to be statistically significant in favor of the higher performing group: 1) Admission of anxiety as a factor preventing learning and memory (t=4.671, p<.001), 2) A sensation of uneasiness when being questioned (t=3.552, p<.05), 3) Ability to learn from one's mistakes (4.165, p<.001), 4) A tendency to worry regarding direct questioning (6.599, p<.001), 5) When questioned, reflects on poor performance (t=6.569 , p<.001), 6) When studying at home, reflects on things that an instructor or preceptor taught (t=5.419, p<.001), 7) Has difficulty extracting main ideas from text (t= 2.706, p<.001), 8) Copies notes repeatedly during study (t= 6.676, p<.001), 9) Does practice exercises at the end of chapters (t= 4.137, p<.001), 10) When reading, stops and reviews frequently (t= 2.535, p<.05), 11) When reading, repeats main points over and over (t= 8.069, p<.001), and 12) Outlines book chapters to facilitate study (t= 8.196, p<.001).

The next phase of the analysis involved the use of hierarchical linear regression to determine the effect of selected academic variables on knowledge-based achievement, as measured by the HESI E-2™ examination. The first step of the analysis included the total, nursing specific and science grade point averages. The second step of the model introduced the total scale scores for the AO and the MSLQ. Table 1 reports the results of the regression analysis. During step 1 of the analysis the cumulative and science GPAs were excluded due to issues of tolerance. During the second step of the model, cumulative and science GPAs as well as the MSLQ total score were excluded. The adjusted R square in the first step of the model indicated that 30.2% of the variance in the HESI E-2™ score was explained by the model (i.e. the nursing GPA). The adjusted R square in the second step of the model indicated that 45.1% of variance was explained by the model. Therefore a progression was seen between step 1 and 2 wherein a greater degree of variance was explained with the addition of the motivation scale scores, and resulting in a higher degree of statistical significance (p<.05 versus p<.001). The results to this point focused on performance on the HESI E-2™ examination. However, in addition, the authors were

interested in the degree to which motivation might impact actual clinical performance as measured by their ability to perform patient management tasks within the simulated task environment. Table 2 lists the results of independent samples t-tests that compare the mean scores on the respective instruments based upon a high performing-low performing split. This time, group assignment was based upon the participant's ability to halt or reduce physiologic instability on the respective scenarios in the simulated environment. This resulted in different group distributions for each of the scenarios. The results in Table 2 reflect a uniform trend towards higher performance on both the AO and the MSLQ by participants who were able to effectively manage the physiologic stability of the patient in the simulation scenarios.

Discussion

The present study examined the relationship among achievement orientation, performance on standardized testing, and clinical performance in a simulated task environment in a group of senior nursing students. Findings from the present study demonstrate significant relationships. The findings are discussed according to the aims of the study.

The first aim was to determine the relationship between motivation and achievement on standardized testing. Students were grouped into high performance group (HPG) and a low performance group (LPG) based on the HESI-E2. The two groups were first compared on basic achievement motivation using the AO. Statistically significant differences were noted in the two groups with the HPG demonstrating higher scores. The AO has been associated with a more sociological orientation ('striving for status') [38] which could be argued is aligned with a more performance or extrinsic goal orientation. However, another study found a greater percentage of mastery goal oriented students in the health professions which are more commonly associated with intrinsic motivation [19]. In the second comparison between the two groups, scores on the MSLQ were used to determine differences in motivation–related constructs associated with learning. Again the findings were statistically significant ($t=2.981$, $p< .05$) in favor of the HPG. Similar results from two motivational measures appear to further validate the importance of motivation in achievement which has been evident in the health sciences literature [22,23].

In the next phase, a regression model that included the nursing GPA and the motivation scores accounted for a significant portion of the variance. Using a hierarchical regression model, the nursing GPA and the Ray-Lynn Achievement Motivation Inventory demonstrated significance, while the MSLQ was eliminated due to excessive variance in scores related to the dependent variable. These findings support the positive relationship between achievement orientation (Motivation) and performance and reflect similar findings from studies involving dental students and medical students [27,28].

The second aim was to determine the relationship between motivation and clinical performance in a simulated task environment. The authors considered motivation within the context of achievement goal theory and its impact on actual clinical performance using clinical scenarios in a high fidelity simulated task environment. Findings revealed a consistent trend toward higher scores on both the AO and the MSLQ in participants who were more effective in stabilizing their patients. These findings appear to be some of the first evidence tying motivational aspects measured within the context of achievement goal theory to clinical performance measured within the context of a simulated task environment. This finding supports Ericsson's conception of motivation as essential to skill development performance [5-7]. Future research needs to further delineate the relationship of achievement motivation and clinical performance. This should include methodologies that could confirm the transfer to actual practice of the knowledge, skills, and attitudes associated with high performance in simulated settings. An interesting perspective was recently reported in a study investigating the relationship among high fidelity simulation (HFS), clinical judgement and motivation measured by the MSLQ in a group of nursing students [44]. The authors reported that students having students participate in high fidelity simulation activities resulted in significant improvements in their clinical judgement and their achievement motivation. These findings certainly warrant further investigation into the relationship between HFS and motivation.

Conclusions

The present study provided further support for the importance of motivation within the context of achievement goal orientation to performance on standardized testing in health sciences. This supports the notion that valid and reliable instruments can be used to judge the achievement orientation of students in order to positively affect achievement related constructs. Further, the study findings provided some of the first evidence of a relationship of achievement motivation to clinical performance as measured in a simulated task environment. The need for further studies in this area is of particular importance to the health sciences where the stakes are so high. No longer can health science educational programs in general, and nursing programs in particular, be content with minimal levels of competency. Twenty-first century healthcare will require clinicians who not only acquire competency, but also acquire habits of mind that drive them to engage in continuous improvement of their knowledge, skills, and aptitudes. Deliberate practice can provide a framework that supports a lifelong quest for excellence [6,45].

The results of the current study provide valuable linkages between achievement orientation and clinical performance. While limited in its scope, this study indicates a need for further exploration related to achievement orientation and its' linkages to academic success and clinical skill in nursing education. With additional study and consideration, it is feasible that achievement orientation may be a viable addition to student screening practices. Given current limitations in enrollment and budgets across the world, there is a need to maximize student success by recruiting students who have both the capabilities and the motivation to achieve.

Limitations and Implications

The present study had several limitations. The study was conducted at a single public, state university in the Southeast and included a group of traditional baccalaureate nursing students who volunteered to participate. Therefore, findings may not be generalizable to other types of programs or institutions. The analysis was done according to the multivariate regression model since it required the largest number of participants. The power analysis was conducted using medium effect size, using the formula $F^2=R^2/ (1-R^2)$. According to this calculation, a sample size of 75 would have been required optimally. The actual sample size for the study was 26, and was representative of the student cohort from whom it came in terms of age, gender and ethnicity. In studies based on the Expert Performance Approach, smaller sample sizes are the norm due to the voluminous data used in the studies [9,10]. The high-fidelity simulated task environment, while able to provide many aspects of the real clinical environment, in fact, is not completely authentic. This may have resulted in participant responses that were different from responses elicited in the actual clinical setting. Finally, though two different measures of achievement motivation were used, given the acknowledged complexity of the concept, other measures may have resulted in different findings.

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