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Predicting Nursing Program Success for Veterans: Examining the Importance of TEAS and Pre-Admit Science GPA☆

Lynn Van Hofwegen*, Monika Eckfield, Oscar Wambuguh

California State University, East Bay, United States of America

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ABSTRACT

Background: Support for veterans in nursing education programs is a priority in universities across the U.S. While studies have examined the relationship between admission criteria and successful nursing program outcomes, minimal data are available regarding predictors of veteran student success.

Methods: Success for veterans in one university BSN nursing program was examined, as measured by three outcomes: Nursing program graduation GPA, graduation rate, and NCLEX-RN pass rate, as predicted by two admission criteria: GPA and TEAS.

Results: Among veteran students, pre-admit science GPAs at or above the median score (3.41) predicted higher nursing program graduation GPA, but did not predict graduation rates or NCLEX-RN pass rates. TEAS scores were not predictive of nursing program graduation GPA, graduation rates or NCLEX-RN pass rates. In comparison, veteran and non-veteran nursing students' graduation rates and NCLEX-RN pass rates were similar; with average nursing program graduation GPAs slightly lower for veterans. Veterans contributed gender, age, and cultural diversity to the nursing student body. When NCLEX-RN exam retakes are included, 100% of all veteran participants were successful, a possible indicator of resilience and work ethic.

Conclusion: Further discussion is indicated regarding nursing program admission criteria, and factors for success of veterans in nursing programs.

Introduction

Each year approximately 300,000 veterans return to civilian life and work (https://www.data.va.gov). Many of these highly qualified veterans have valuable training and work experience, some in healthcare professions. The potential contribution of veterans to the nursing profession is well recognized. Nursing programs across the United States (U.S.) are implementing strategies to incorporate veterans in nursing education. In California, and across the nation, legislation has been enacted to give veterans priority admission into educational programs and military service credit for pertinent medical experience (California Board of Registered Nursing, 2015; State of California, 2012). The need for nursing curriculum to address the unique healthcare needs of veterans has also been recognized in national initiatives, such as Joining Forces, which has been widely supported by nursing education programs throughout the nation (Elliott & Patterson, 2017).

At the same time, nursing programs, along with other health profession programs across the United States, are examining their admissions criteria and evaluating whether they are effectively selecting candidates who will meet the need for increased diversity in the healthcare workforce (Urban Universities for Health, 2014). However, nursing has lagged behind other professions, such as dentistry, medicine and pharmacy, in adopting holistic admissions review processes and graduating students from a broad range of backgrounds (Glazer et al., 2016; Urban Universities for Health, 2014). Given veteran's unique life experiences and the need for more healthcare providers who understand the needs of veterans and military families, veteran nursing students may contribute positively to the diversity of the profession.

In 2015, the nursing program at the California State University, East Bay, began evaluating its current admissions policies in order to align the process with its mission of preparing a diverse and inclusive nursing workforce (Wambuguh, Eckfield, & Van Hofwegen, 2016). California State University, East Bay is a state funded university with an enrollment of approximately 15,000 students located in the socioeconomically diverse, multicultural, urban San Francisco Bay Area. The majority of the student population in the university is the first in their family to go to college. Student composition includes approximately 26% who identify as Hispanic, 25% as Asian/Pacific Islander, 20% as Caucasian, 11% as

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* Corresponding author at: Department of Nursing, CSU East Bay, SF 510, 25800 Carlos Bee Blvd, Hayward, CA 94542, United States of America.
E-mail address: Lynn.vanhofwegen@csueastbay.edu (L. Van Hofwegen).

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African Americans, 11% as "Other", and 7% as International students. Our university is designated a Hispanic Serving University by the U.S. Department of Education, is a member of the Coalition of Urban Serving Universities, and has been recognized as one of the most diverse universities in the country. Admission to the nursing program is highly competitive with over 900 students vying for 126 seats each year. Admission criteria for the nursing program have historically been heavily weighted on GPA and TEAS scores, with factors such as previous healthcare experience, language fluency, and enrollment at the university for science prerequisites included with lesser weight. This competition for admission has resulted in an average pre-science GPA of 3.8 among entering nursing students (Wambuguh et al., 2016). However, our program has also had a unique policy in place in which all U.S. military veteran applicants who meet the minimum requirements for admission, including a baseline 3.0 GPA, have been accepted to the nursing program. Over the past five years, between 10 and 25% of the admitted students have been veterans, and veteran students' interest in our nursing program is growing. In the past academic year (2017–18), over 60 veterans applied for admission to our BSN Program.

Since the admission GPA and mean TEAS scores for our veterans who receive priority admission are generally lower than that of other nursing students, this study provides an opportunity to examine the importance of GPA and TEAS scores for success in nursing; and at the same time, to provide insight into the success of veterans in baccalaureate nursing education. The role of admission criteria in the selection of diverse nursing students, including students with military experiences, is a significant discussion for nursing education and ultimately, the nursing profession.

Since we have had a high number of veteran applicants since 2009 and subsequently, a cohort of students for whom academic metrics were not the most important admissions criteria, we recognized we had an opportunity to evaluate evidence on alternate academic criteria at the point of program entry. The primary purpose of this study was to examine how well the academic admissions data of the veteran student cohort predicted specific quantitative measures of success at the completion of the program. Our study measured success for veterans in our nursing program by their nursing program graduation GPA, graduation rate, and first-attempt NCLEX-RN pass rate and evaluated whether those outcomes could be predicted by two admission criteria, pre-admit science GPA and TEAS score. A secondary purpose was to compare veteran success in the nursing program to that of non-veteran students, and to compare demographic characteristics of our veteran and non-veteran students to see whether, and in what ways, veterans impacted the diversity of the nursing student body. This evidence may serve as a basis for further refinement of admission criteria and program development in support for veterans' success in nursing.

Review of literature

Veterans in nursing

While considerable attention has been focused on veterans' healthcare and supporting veterans' education, research regarding the success of veterans in nursing education is less evident. For the purposes of this study, veterans are defined in accordance with the Department of Veterans Administration (DVA) as "a person who served in the active military, naval, or air service and who was discharged or released under conditions other than dishonorable" (Department of Veterans Affairs, 2017). Veterans are multifaceted and diverse as a population, and military training and experience is often considered a culture that significantly influences its members (Olenick, Flowers, & Diaz, 2015; Whitley, Tschudi, & Gieber, 2013). The military culture includes clear structure and hierarchy, adherence to order and procedure, and strong teamwork and cohesion (Whitley et al., 2013). To help veterans transition from the military to the civilian workforce, the U.S. offers the GI Bill that provides support for service members to earn post-secondary certificates or degrees. According to the National Veteran Education Success Tracker, over 850,000 veterans have enrolled in colleges or universities using the Post-9/11 GI Bill since 2009 (Cate, Lyon, Schmeling, & Bogue, 2017). By 2015, 54% had completed their degrees, 18% were still enrolled in programs, and 28% were lost to attrition (Cate et al., 2017). Of the veteran students completing degrees, approximately 10% were in health-related fields (Cate et al., 2017).

The transition from military to civilian life can be challenging for many veterans, and the transition to an academic setting presents unique challenges (Ackerman, DiRamio, & Garza Mitchell, 2009). Veterans point to the self-discipline, time management and goal-setting skills they learned in the military, as attributes that help them in college. However, veterans also note challenges to integrating into university settings, particularly adjusting to the collegiate culture and establishing supportive relationships with others (Ackerman et al., 2009). From a university perspective, veterans are often viewed as a resource bringing leadership skills and maturity to classrooms (Ackerman et al., 2009) and many university systems are working to establish veterans' centers on campus to help these students with the transition (California State University, 2017; Marcus, 2017). Supportive services that act as bridges to education can benefit veterans by helping them identify resources that are available to them on university campuses.

California has approximately 1.9 million veterans. Of these, about 185,000 (or 9.7%) are women, almost one million are currently over the age of 60 (52.3%), and 26% of veterans report a disability (Blanton, 2013). Homelessness and poverty are a concern among veterans particularly the younger population (Blanton & Foster, 2012). Many veterans face mental health concerns related to combat experiences and may be reluctant to seek support due to perceived stigma around mental health issues (Olenick et al., 2015; Whitley et al., 2013).

Veterans who enroll as nursing students may have experiential differences from other students in nursing that may influence their success in nursing education. These experiential differences may include intensive military training as well as deployment experiences. Nursing programs specifically tailored for veterans, such as the Veterans BSN programs sponsored by Health Resources and Services Administration (HRSA), may provide a supportive, timely program that gives recognition to previous military training (Whitley et al., 2013). However, not all veterans will be able to attend these programs and supportive approaches for all nursing education programs are needed. Further understanding of factors that lead to success in nursing education for veterans can inform curriculum, highlight the need for support resources, and enhance the educational experiences and outcomes for veterans.

Academic success in higher education has been described in multiple ways indicating the complexity of learning. Program completion and graduation rate are frequently used as a measurement of success and have been equated to acquisition of essential knowledge and skills through significant learning experiences (Wambuguh et al., 2016). Lack of academic success, or failure, is of concern in higher education as resources, both time and material, are limited and personal cost to student and family may be high. Given the high resource cost of nursing education, lack of success, or failure, in nursing education may be particularly concerning from the resource perspective. The complexity of learning, specifically in an essential profession such as nursing, points to the need to optimize success in nursing education.

Success in nursing education

Success in nursing education has been measured at the program level in a variety of ways, including retention, attrition and graduation rates, NCLEX-RN pass rates, GPA, and graduate employment. Nursing programs carefully track and gather this information. A review of the literature of nursing student success in the last decade reveals multiple research studies regarding factors associated with student success and admission criteria to predict success. NCLEX-RN pass rates have been

frequently addressed in the literature. Crow et al. (2004) conducted a national survey of BSN program strategies for successful NCLEX-RN pass rates and found standardized entrance exams to be a common approach. A comprehensive review of the literature by Quinn et al. (2017) found multiple strategies to support student NCLEX-RN success were used by nursing programs including developing critical thinking, test taking skills and supporting personal wellbeing. Other factors identified as significant variables associated with NCLEX-RN outcomes include early academic achievement (Newton, Smith, Moore, & Magnan, 2007; Schmidt & MacWilliams, 2011), scholastic aptitude (Newton & Moore, 2009), advanced grades in medical-surgical nursing courses (Seldomridge & DiBartolo, 2004; Stuenkel, 2006), and science knowledge (Wolkowitz & Kelley, 2010). The use of standardized testing during the nursing program and at program completion as predictors of NCLEX-RN success has also been a focus of attention as nursing programs have sought to enhance student success in their programs. Standardized exit testing scores such as HESI or ATI were found to be predictive of success on NCLEX-RN testing (Alameida et al., 2011; Elkins, 2015; Landry, Davis, Alameida, Prive, & Renwanz-Boyle, 2010; Wolkowitz & Kelley, 2010).

Non-academic factors, such as self-esteem and self- regulation also influence success for students (Wambuguh, 2015). Self- efficacy expectations (Silvestri, Clark, & Moonie, 2012) and student motivational levels (Goodman et al., 2011) were found to contribute to successful NCLEX-RN outcomes. Beauvais, Stewart, DeNisco, and Beauvais (2013) found a correlation between success in nursing education and student psychological empowerment, resilience, spiritual wellbeing, and emotional intelligence, particularly managing emotions; however, these factors are less straight-forward to assess compared to academic factors.

In an integrative review of the literature regarding academic performance, clinical performance and attrition of nursing students, Pitt, Powis, Levett-Jones, and Hunter (2012) identified four categories that may influence student performance - demographic, academic, cognitive and personality/behavioral factors. Demographic factors including age, gender, English as a primary language, and concurrent employment have been explored in relationship to attrition and NCLEX-RN pass rates. Among these factors, findings have been mixed. In some studies, findings indicate increased success for older students; in others there is no difference in performance (Pitt et al., 2012). Similarly, findings are mixed with no difference or somewhat poorer performance for males (Kaddoura, Flint, Van Dyke, Yang, & Chiang, 2017; Pitt et al., 2012). Students for whom English is a second language were found to have more difficulty regarding success on NCLEX-RN (Hansen & Beaver, 2012; Pitt et al., 2012; Salamonson, Everett, Koch, Andrew, & Davidson, 2008). Likewise, employment during the academic nursing program may negatively influence student outcomes (Alfano & Eduljee, 2013; Pitt et al., 2012).

While many factors contributing to student success are evident in the literature, admission criteria have not reflected this. Historically, admission criteria have been based primarily on academic factors such as science GPA, which has been supported in the literature as a reliable predictor of success in nursing (Schmidt & MacWilliams, 2011; Newton & Moore, 2009; Newton et al., 2007; Seldomridge & DiBartolo, 2004; Gardner, 2005; Stuenkel, 2006; Grossbach & Kuncel, 2011). Pre-admisssion test scores, such as the TEAS test, are considered reliable predictors of program success as measured by first time NCLEX-RN pass rates (Alameida et al., 2011; Elkins, 2015; Wolkowitz & Kelley, 2010).

Given the literature regarding prediction of student success in nursing, we sought to examine the success of veterans in our BSN program. Specifically, we examined how well the academic admissions data of the veteran student cohort predicted quantitative measures of success in the nursing program. The study was based on the null hypothesis that the independent variables (pre-admit science GPA and TEAS) had no effect on each of the dependent variables or outcomes (graduation rate, passing the NCLEX-RN on first attempt, and nursing program graduation GPA).

Table 1
Demographic characteristics of veteran and non-veteran students in the nursing program at CSUEB in 2009–2013.

Characteristics	Vets (n = 55)	Non-Vets (n = 584)
Age		
< 25 years	24%	57%
26–30 years	46%	16%
31–40 years	19%	18%
> 40 years	11%	9%
Gender		
Male	57%	20%
Female	43%	80%
Ethnicity		
Caucasian	39%	33.6%
Asian/Pacific Islander	13%	28.8%
Filipino	19%	18.0%
Latino	20%	8.6%
African American/African	5%	2.9%
Other	4%	8.2%

Study sample

The student veteran data set used in this study included 55 student veterans enrolled in nursing program in the 5 years from 2009 to 2013. They were expected to graduate from the nursing program between 2011 and 2016. There were 2 student veterans in 2009, 7 students in 2010, 16 students in 2011, 12 students in 2012, and 18 students in 2013, making the study's total sample size of 55. The student veteran population was 57% male, and 43% female and student veterans' ages ranged from 22 to 62 years of age with 24% < 25 years, 46% between 26 and 30 years, 19% between 31 and 40 years and 11% > 40 years of age. Ethnicity reported by the student veterans indicated that 39% identify as Caucasian, 5% as African American, 20% as Latino, 19% as Filipino, 13% as Asian, and 4% as other or mixed ethnicity (Table 1).

Methods

The logistic regression model was used on the data set to determine whether the two admission criteria (TEAS and pre-admit science GPA) currently used by our nursing program were predictive of nursing student outcomes as measured by the three outcome variables (graduation, passing the NCLEX first time, and nursing program graduating GPA).

Data from all years with values for each of the two predictors (TEAS and science GPA) and three outcome variables (graduation rate, nursing program graduation GPA, and passing the NCLEX-RN exam) were combined. Using Microsoft Excel, the data were sorted, processed and organized in a format that was exportable to statistical analysis software. The IBM SPSS® software platform was used for statistical analysis. The Institutional Review Board at CSUEB approved de-identified student data for this study.

Logistic regression is a variation of ordinary regression, useful when the observed outcome is restricted to two values, which usually represent the occurrence or non-occurrence of some outcome event (usually coded as 1 or 0, respectively) (Zar, 2009). In this study, data were organized to produce two outcomes, a value of zero (0) and a value of one (1) in each of the two predictor variables and the three outcome variables as explained below.

If the variable of interest was not fulfilled or pre-admit science GPA and TEAS were below a certain cut-off value (explained below) a code of 0 was used. A code of 1 was used for all cases where the variable was fulfilled, or student had values above the cut-off point. As noted by Bickel (2003), the median is often the preferred measure of central tendency (instead of the mean) for asymmetric data because it is closer to the mode and is insensitive to extreme values in the sample. Examining veteran students' pre-admit GPAs for the five years, we decided on a science GPA cut-off of 3.43. This cut-off is the median pre-admit

science GPA and appears appropriate as most veteran applicants accepted in the nursing program had pre-admit science GPAs ranging from 3.0–4.0. Students with a pre-admit science GPAs of 3.43 and below were coded 0, while those with GPAs above 3.43 were coded 1. For TEAS cut-off for coding purposes, review of the five-year data indicated veteran students had a median score of 79, with a range of 55.6–94.7, allowing us to justify coding students with TEAS score below 79 with a 0 while those with 79 and above were coded 1.

For the three outcome variables, students graduating from the nursing program were coded 1, while those who had not graduated were coded 0. Those who had passed NCLEX-RN on first attempt were coded 1, and those who did not pass the NCLEX-RN exam either because they had failed on their first attempt or were not eligible to take the exam due to not graduating were coded 0. Nursing program graduation GPAs over the five-year period, ranged from 1.42–3.95 with a median of 3.13. We used this median as the cut-off for coding purposes. This was found appropriate since half of the students had GPAs below it, and the other half had GPAs above it. Thus, students with a GPA of 3.13 and above were coded 1, while those with GPAs below 3.13 were coded 0.

The logistic model produces a formula that predicts the probability of the occurrence as a function of the independent variable(s), and thus can be used to predict the probability of a hypothetical student attaining a certain outcome. The model also generates the standard errors of estimate and significance levels of a prediction formula and odds ratios (O.R.) associated with each predictor value (with 95% confidence intervals). The *odds* of an event is defined as the probability of the outcome event occurring divided by the probability of the event not occurring. The odds ratio for a predictor provides the relative amount by which the odds of the outcome increase (O.R. $>$ 1.0) or decrease (O.R. $<$ 1.0) when the value of the predictor value is increased by 1.0 unit (Agresti, 2007; Hosmer, Lemeshow, & Sturdivant, 2013). Odds ratios were generated in this study as presented in the results section, along with probability of the identified outcomes. Statistical significance was evaluated at the probability significance level of 0.05.

Results

The logistic regression model's simultaneous analysis of the two-predictor variables as determinants of three student outcomes (graduating from the program, passing the NCLEX-RN on first attempt, and nursing program graduation GPA of 3.13 and above), yields one non-significant and two significant chi-square results (1.04, df = 2, p = 0.6; 7.18, df = 2, p = 0.03; and 9.93, df = 2, p = 0.007 respectively). The null hypothesis of the study assumed the two independent variables had no effect on the outcome measures. In all cases where the two independent variables were incorporated in the logistic model to predict the outcome measures; a) for one outcome [graduation rate], the model fit was good with a low chi-square value (p value $>$ 0.05); and, b) for two outcome measures [NCLEX-RN and nursing program graduation GPA] the model fit was poor with higher chi-square values (p values $<$ 0.05). The chi-square goodness of fit test is a measure of how well the independent variables affect the outcome or the dependent variable. Had all three cases been good fits, the interpretation would be that the data set supported the null hypothesis. In other words, there would be no evidence that the two independent variables contribute to the prediction of the three outcome measures. In this study, at least one (pre-admit science GPA) of the two independent variables was important in predicting at least two of the outcome measures (NCLEX-RN pass rate and nursing program graduation GPA). This resulted in relatively higher chi-square values in two of the three cases, with both significant at the probability level of 0.05.

TEAS, Pre-admit science GPA and graduation rate

Of the two predictors thought to be associated with graduation from the nursing program, logistic regression analysis indicates that TEAS and pre-admit science GPA result in statistically non-significant results (chi-square = 1.04; p = 0.6, Table 2). Students with a TEAS score of 79 or pre-admit science GPA of 3.43 or higher had no better odds (or higher probability) of graduation than those with scores below 79 or lower pre-admit science GPA (Table 2).

Table 2
Logistic regression analysis data of two predictor variables and one outcome (graduation rate) for nursing program student veterans for years 2009–2013 (n = 55).

6 cases have Y = 0 (not graduating); 49 cases have Y = 1 (graduated)

Overall Model Fit: Chi Square = 1.0357; df = 2; p = 0.5958
Intercept 1.7360; StdErr 0.6424; p = 0.0069

			Odds ratio	95% CIs		
Variable	Coeff.	StdErr	O.R.	Lower–Upper		p
1TEAS	−0.09	0.95	0.92	0.14	5.90	0.93
2SciGPA	0.93	0.99	2.55	0.36	17.83	0.35

The 95% CI is often used as a proxy for the presence of statistical significance if it does not overlap the null value (OR null value = 1). As Table 2 shows for both predictor variables, an odds ratio of 1 is contained in between the 95% confidence interval for both predictors confirming the null hypothesis.

TEAS, Pre-admit science GPA and NCLEX-RN

Logistic regression analysis indicates that of the two predictors thought to be associated with the student outcome of passing the NCLEX-RN on first attempt, are not statistically significant predictors (chi square = 2.77, p = 0.25; Table 3). Students with a TEAS score of 79 or higher and those with a pre-admit science GPA of at least 3.43 or higher had the same odds of passing the NCLEX-RN on first attempt as those with scores below 79 or pre-admit science GPA of 3.43. As Table 3 shows for TEAS and pre-admit science GPA, an odds ratio of 1 is contained in between the 95% confidence interval for the predictor confirming the null hypothesis (OR null value = 1).

TEAS, Pre-admit science GPA and nursing program graduation GPA

The results of logistic regression analysis highlights one variable (pre-admit science GPA) as a statistically significant predictor of a nursing program graduation GPA of at least 3.13 (chi-square = 9.93; p = 0.007, Table 4). Students with a pre-admit science GPA of at least 3.43 or higher increased their odds of graduating with a GPA of 3.13 in nursing program by a factor of 3.73 (Table 4). On the contrary, students with a TEAS score of 79 or higher had the same odds of graduating with a nursing program graduation GPA of 3.13 or higher as those with

Table 3
Logistic regression analysis data of two predictor variables and one outcome (passing the NCLEX-RN on first attempt) for nursing program student veterans for years 2009–2013 (n = 55).

8 cases have Y = 0 (not passing NCLEX-RN or not eligible to take); 41 cases have Y = 1 (passing NCLEX-RN on first attempt)

Overall Model Fit: Chi Square = 2.7659; df = 2; p = 0.2508
Intercept 1.1877 0.5724 0.0380

			Odds Ratio	95% CIs		
Variable	Coeff.	StdErr	O.R.	Lower – Upper		p
1TEAS	−0.26	0.89	0.77	0.13	4.47	0.77
2SciGPA	1.47	0.99	4.36	0.63	30.13	0.13

Table 4
Logistic regression analysis data of two predictor variables and one outcome (nursing program graduation GPA) for nursing program student veterans for years 2009–2013 (n = 55).

27 cases have Y = 0 (GPA < 3.13); 28 cases have Y = 1 (GPA ≥ 3.13)

Overall Model Fit: Chi Square = 9.9265; df = 2; p = 0.007
Intercept −1.1253; StdErr 0.5041; p = 0.0256

			Odds ratio	95% CIs		
Variable	Coeff.	StdErr	O.R.	Lower – Upper		p
1TEAS	0.83	0.63	2.29	0.67	7.84	0.19
2SciGPA	1.31	0.62	3.73	1.1	12.67	0.03

scores lower than 79. As Table 4 shows for TEAS, an odds ratio of 1 is contained in between the 95% confidence interval confirming the null hypothesis for this predictor (OR null value = 1).

In summary, for the pre-admit science GPA scores of 3.43 and above, the logistic model gives a p-value of 0.55 (about 55%). Hence, a hypothetical student with a pre-admit science GPA score of at least 3.43 has a 55% probability of successfully graduating from the nursing program with a GPA of at least 3.13. Similarly, pre-admit science GPAs of below 3.43 give a p-value of 0.24 and a probability of 24% (lower by 31%) of successfully graduating with nursing program graduation GPA of at least 3.13.

Discussion

Predictors of Success

In our analysis of two academic admission criteria currently used in our program, pre-admit science GPA and TEAS score, as predictors of nursing program success, we found that a pre-admit science GPA of 3.43 or higher was not predictive of the outcome measure, passing NCLEX-RN on first attempt; but it was predictive of achieving a nursing program graduation GPA of 3.13 or higher. Since most subjects in the sample graduated, graduation rates were not significantly influenced by pre-admit science GPA or TEAS scores. Interestingly, higher TEAS scores did not predict any of the three outcome measures.

These findings appear to differ from a previous study by this team (Wambuguh et al., 2016) that found pre-admit science GPA was useful in predicting NCLEX-RN first time pass rates and higher nursing program graduating GPA. It is most likely that the small sample size of this veteran group (n = 55) is responsible for this. As the earlier study (Wambuguh et al., 2016) suggested there may be a plateauing effect of high pre-science GPAs. In this study, students achieving a 3.43 pre-science GPA or higher did not increase their odds of passing the NCLEX-RN exam on the first attempt. Despite this finding, we feel that evidence is available to support admissions criteria that uphold the value of strong pre-science GPAs by awarding equal points to students meeting or exceeding a specific academic threshold (for example, a minimum 3.5 pre-science GPA), rather than emphasizing and prioritizing applicants with the absolute highest scores on academic metrics. Adjustments to admissions criteria such as this may allow points to be awarded to candidates exemplifying additional qualities that contribute to success in nursing programs and in nursing careers.

When examining the predictive utility of admissions criteria on the likelihood of passing the NCLEX-RN exam on first attempt, we also discovered veterans were highly successful in passing the NCLEX-RN exam on the second attempt. Of the 55 student veterans in the study, six did not graduate and were not eligible to take the exam. One student who graduated chose not to take the exam for unknown reasons. Of the 48 students in the study who graduated and were eligible to take the licensing exam, 41 (85.4%) passed NCLEX-RN on first attempt. Seven veterans passed the NCLEX-RN on retake for a total of 48 student veterans who passed the exam. This brought the veteran students' total NCLEX-RN pass rate to 100%, with one student veteran who (for unknown reasons) did not take the exam. The total NCLEX-RN pass rate of 100% including retakes for veterans may be a more important measure of success in the nursing profession, and may speak to non-academic factors such as perseverance and work ethic that may inform the holistic admissions review conversation. This incidental finding also raises the question of whether nursing schools should focus exclusively on first-attempt pass rates for the NCLEX-RN, or whether a more inclusive measure of success, such as how many students pass the NCLEX-RN within 12 months of completing their nursing program, should be considered.

The findings from this study on the utility of the TEAS exam to predict nursing program success differed from those of our previous study of all undergraduate baccalaureate students enrolled in 2009–2012, which found both TEAS and Science GPA to be significant predictors of program outcomes (Wambuguh et al., 2016). The veteran student sample TEAS scores ranged between 55.6 and 94.7 (mean = 78.9; standard deviation = 8.45) compared to the general student population range of 60.6–97 (mean = 84.2; standard deviation = 6.65). The most likely reason for TEAS's less predictive ability in this veteran population is the effect of the small sample size (55 students) which comprises 10% of the general student population. Future analysis with additional veteran data will likely reverse this statistical aberration with regard to TEAS predictive ability.

When we compared the success of veteran students to non-veteran students, program outcomes were very similar (Table 5). The number of veteran students completed the program and graduated was 89.1% as compared to 89.3% for the non-veteran pre-licensure group. The NCLEX-RN first time pass rate for the veteran students was 85.4%, whereas the NCLEX-RN first time pass rate for the non-veteran pre-licensure student group was 86.8%. The average nursing program graduation GPA for the veteran student group was 3.13, while the average overall nursing program graduation GPA for the non-veteran pre-licensure student group total pre-licensure group over a similar time was 3.35. While the sample sizes of these two groups were quite different, it appears that the program outcomes for the veteran student group differed little from that of the non-veteran pre-licensure student group pre-licensure group in overall nursing program graduation GPA with minimal difference evident for graduation rates and first time NCLEX-RN pass rates.

In the context of developing a diverse nursing workforce, it is interesting to note that the demographic data provide evidence that veteran students contribute to greater student body diversity with regard to the age, gender and ethnic composition of our program. The veteran student population was 57% male, and 43% female, compared to 20% male in the non-veteran pre-licensure student cohort. The veteran student sample represented a greater percentage of older students, with 76% of the veteran cohort over 25 years of age as compared to 43% of

Table 5
A comparison of graduation rates and NCLEX-RN pass rates for veterans and non-veteran students in the nursing program at CSUEB between 2009 and 2013.

Outcome measures	Vets (n = 55)	Non-vets (n = 584)
Graduation rates (# and %)	49 (89.1%)	522 (89.3%)
1st time NCLEX pass rates (# and %)	41 (85.4%, n = 48)	449 (86.8%, n = 517)
2nd time NCLEX pass rates (# and %)	7 (100%, n = 7)	54 (100%, n = 54)
Total NCLEX pass rates (# and %)	48 (100%, N = 48) 1 did not take	503 (97.3%, n = 517) 5 did not take
Average nursing program graduation GPA	3.13	3.35

the non-veteran pre-licensure student cohort. Ethnicity reported by the student veterans indicated that 39% identified as Caucasian, 5% as African American, 20% as Latino, 19% as Filipino, 13% as Asian, and 4% as other or mixed ethnicity. In the non-veteran pre-licensure student cohort, 33.6% identified as Caucasian, 2.9% as African American, 8.6% identify as Latino, 18% as Filipino, 28.8% as Asian and 8.2% as other or mixed ethnicity (Table 1). Of the student veteran population, 27% percent (15) report previous healthcare experience as compared to 18% (95) of the non-veteran pre-licensure student cohort.

Implications for nursing education and research

This study's focus on predictors of success for veteran students in nursing education has implications for multiple issues of current importance in baccalaureate nursing education. Significant attention is currently directed to the priority admission of veterans into educational programs of nursing, recognition of veterans' prior training in health professions, and ultimately successful program completion for veterans and their entry into the nursing profession. This study provides support for giving priority admission to veterans as a way to enhance the diversity in ethnicity, gender, age and life experiences among the nursing student body.

The findings of this study also inform critical questions in nursing education regarding student success and contribute to the growing body of knowledge regarding admission criteria, particularly holistic review admission criteria. These results provide much needed data regarding the outcomes of students admitted to nursing programs following alternate academic criteria. Data presented here contribute to a national discussion of appropriate minimum academic benchmarks, which could be instituted in lieu of admission point structures that are heavily weighted toward students with highest academic performance. While there is little debate that nursing school applicants need to be adequately prepared for the academic rigors of the professional program, the movement toward a holistic assessment of candidates requires a thoughtful balance of academic readiness with non-academic qualities integral to the profession.

This study provides a baseline of predictors of success for veterans and conversely provides insight into early indications of students who may benefit from additional support. Further study regarding the experiences of veteran students, and their perceived challenges and resources, is needed. Care must be taken to recognize the unique experiences of individual veterans and to avoid adopting “one size fits all” approaches. Identifying and refining models to support the transition of veterans into nursing education and professional practice is certainly anticipated to be a continuing national priority.

Study limitations

This study examines the admission data and outcomes of veterans admitted to one baccalaureate school of nursing. It is limited by the small sample size ($n = 55$) and the unique nature of the nursing program's policy toward veteran applicants. Further study of veteran students in a wider variety of nursing programs would be needed to verify these findings. Generalizability may be limited by the small sample from one nursing program. The findings speak specifically to this sample in this baccalaureate school of nursing and may only be applicable to nursing programs with similar student characteristics and who give priority admission to veterans. Likewise, we cannot assume that the results of this study reflect the outcomes for students who are admitted based on an alternate admissions criteria but who are not veterans. It is quite possible that the self-discipline, goal setting and time management skills that many veterans develop during their military service contribute to their successful outcomes in nursing programs and are unique qualities and skills to this group.

This study selected median values for the logistic regression model. The median pre-admit science GPA (3.43) was used the cut-off value since most veteran applicants accepted in the nursing program had pre-admit science GPAs ranging from 3.0–4.0. The findings may have been different if different cut scores were used.

This study addresses only three outcomes of success and does not speak to other measures that determine success in the nursing workforce. Additionally, this study does not directly address the many other factors that may contribute to individual student success including self-efficacy, prior life experience and others. The study also does not explore potential barriers to student success including family responsibilities, concurrent hours of work outside of the nursing program, or financial pressures which may influence student success.

Conclusion

The findings of this study contribute to the growing body of research regarding veterans in the nursing workforce, and the evaluation of nursing program admission criteria. Veteran students who have low pre-admit science GPAs compared to their veteran and non-veteran peers tend to graduate at the same rate as others, and have similar chances of passing the NCLEX-RN on their first attempt. However, students with lower pre-admit science GPAs may be at greater risk for course failures and graduating with lower nursing program GPAs compared to those with stronger academic scores at the time they are admitted to the program. Establishing baseline admission academic criteria that are supported by research evidence may decrease the over-emphasis on academic metrics while still supporting academic preparedness, and may help to improve overall student outcomes. Veterans bring unique experiences and perspectives to the profession of nursing that contribute to the diversity of nursing. Attention should be given to the unique needs that veteran students may have as they integrate into academia and the civilian workforce.

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