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Quality improvement: A practical nursing program's admission test☆

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ABSTRACT

Introduction: Academic institutions are under pressure to maintain a nearly flawless retention rate, while graduating successful students. The use of standardized admission tests to provide data driven decisions regarding applicant selection is common. The varying reliability and validity of current standardized tests inspired a large Canadian academic institution to use a faculty developed admission test for admission to its practical nursing (PN) program.

Methods: The target population for this project was a purposive, convenience sample of graduated PN students from a large publically funded polytechnic institution in southern Ontario, Canada, who had completed the Canadian Practical Nurse Registration Examination (CPNRE) within 2014–2016 (n = 293). Data was obtained retrospectively, and included program entry grade-point average (GPA) and CPNRE result, as well as chemistry, English, biology, and math admission test scores.

Results: The predictors of chemistry, English, math admission test scores, and program entry GPA did not have an effect beyond the effects of the model's predictors. In this model, the R^2 suggests that 9% of the variance can be explained, and 91% not explained. In consideration of all independent variables, findings indicate that mean biology admission test scores (M = 74.96) are a predictor of student CPNRE success. Additionally, students who pass the CPNRE have a higher program GPA.

Conclusions: Academic factors including program entry GPA, English, math, biology and chemistry admission scores are a fragment of the characteristics to be considered when determining the predictability of success in PN students. Therefore, it is imperative that program admission processes identify and measure nonacademic program entry criteria, as academic criterion have limited predictability. Furthermore, in isolation, academic admission criteria could be used to identify at-risk-students for appropriate remediation/counselling or as a placement test.

1. Introduction

Academic programs are under immense pressures to graduate successful nursing students, while maintaining a nearly flawless retention rate (Newton et al., 2007). Consequently, the need for accurate candidate selection is paramount. The value of admission testing and, moreover, which selection tools are most valid and reliable at predicting the overall success of a student is unclear (Newton and Moore, 2009). Currently, in Canada, there are a number of nursing program admission tests utilized in post-secondary institutions; nonetheless, the literature on this topic does not support any one particular admission test as a benchmark tool.

Colleges and universities often rely on standardized admission tests to confront the challenge of making data driven decisions concerning applicant selection (Underwood et al., 2013). Nursing programs in particular began using admission tests to inform the selection of a student population that is not only impervious to attrition, but ultimately meets the labour market demands and contributes to the nursing workforce (Underwood et al., 2013). Standardized entrance tests in nursing have been widely used in the United States, and some parts of Canada (Wolkowitz and Kelley, 2010). Research has demonstrated that admissions testing has had some correlation to success in passing national licensure examinations among studies completed in the United States (Pitt et al., 2012). However, some schools in Canada still rely on program applicants to complete a faculty developed admission test, which often does not have robust psychometric measurements

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demonstrating reliability and validity.

In 2014 the Canadian Institute for Health Information (CIHI), reported a net loss of 2360 nurses across Canada (Canadian Institute for Health Information, 2015). This net loss is related to many factors, one of which is the decreased number of new nursing registrants, in all registration classes, graduating from Canadian accredited nursing programs; which slowed to 0.6% in 2013 following a five-year period of 4.7% growth (Canadian Institute for Health Information, 2015). Additionally, the training capacity of practical nursing programs across the country has fallen from 7821 in 2010 to 7460 in 2013 (Canadian Institute for Health Information, 2015). The combination of a reduced number of new nurse registrants and decreased training capacity supports the need for more nurses in Canada. According to the Government of Canada (2015a), between the years 2014–2018, a projected average annual growth rate of 2.8% of practical nursing positions are required to meet the demand for population growth and nursing retirement. To meet this demand, colleges and universities must be able to recruit, retain, and graduate qualified nursing applicants in a timely manner. Moreover, between 2013 and 2016, the national examination pass rates at a large publically funded institution in southern Ontario, Canada, were 83%, 86%, 82%, and 85% respectively. Comparatively, the provincial pass rate averages for the same years was 89%, 91%, 92% and 93%; illustrating that the institution's pass rates are consistently lower than that of the provincial averages over a four-year period (College of Nurses of Ontario, 2013, 2014, 2015, 2016).

2. Literature

A literature review was conducted by targeting studies that communicated findings on the predictability of nursing program admission tests and student success. The databases searched included: Educational Resource Information Center (ERIC), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Google Scholar, and PubMed. Filters were applied to include English language publications over the last 15 years (2000–2015). Search terms included: nursing, school, criteria, admission, college, and test. PubMed MeSH terms included: admission test, college, and nursing. Sixteen articles were selected for review based on their relevance to the topic and shown a higher level of evidence. Two recurring themes related to student success were identified: standardized admission testing and student success as well as admission criteria and student success.

Eight studies found within the literature review focused on standardized tests and their relationship to student success (Chen and Voyles, 2013; Ellis, 2006; Gallagher et al., 2001; Knauss and Wilson, 2013; Manieri et al., 2015; Murray et al., 2008; Newton et al., 2007; Underwood et al., 2013). Manieri et al. (2015) and Newton et al. (2007) both found that Test of Essential Academic Skills (TEAS) scores were statistically significant in predicting program completion within an associate and baccalaureate nursing program in the United States. The descriptive study by Manieri et al. (2015) evaluated associate degree nursing students at a community college in Louisiana. By means of linear regression, Manieri et al. (2015) established that completion of the nursing program was dependent on the examination score of the TEAS, accounting for 5.9%, $p = .004$ of the variability. Similarly, Newton et al.'s (2007) descriptive study in a mid-western state baccalaureate program found nursing aptitude, measured by the TEAS, accounted for 4.8%, $p \leq 0.001$, of the explained variability in academic achievement. The small variance in both of these studies suggests that the TEAS accounts for slight increases in the prediction of student academic achievement.

The Health Education Systems Inc. (HESI) Admissions Test (A^2) was also described in the literature of being able to provide predictive indicators of student success. Knauss and Wilson's (2013) descriptive study of an associate degree program in the southeastern part of the United States found moderate positive correlation between A^2 scores and final grades in two first semester nursing courses, $r = 0.53$, $p < .01$ and $r = 0.45$, $p < .01$ respectively. Murray et al. (2008) in their study of associate degree students in Texas reached a similar conclusion with a moderate to weak positive correlation, $r = 0.25–0.44$, $p = .05–.01$., noting A^2 as a predictor of student success in nursing course grades within the total curriculum. Likewise, Chen and Voyles (2013) and Underwood et al. (2013), findings also show a significantly positive ($p \leq .01$) relationship between A^2 scores and final course grades.

Ellis (2006) and Gallagher et al. (2001) used descriptive studies to establish a relationship between nursing entrance test (NET) scores and student success. Ellis (2006) and Gallagher et al., (2001) found conflicting results in NET scores predictability. Ellis (2006) concluded that higher NET scores were a predictor of success, defined by student retention, χ^2 (1, $n = 137$) = 6.49, $p = .01$; whereas Gallagher et al. (2001) found no significant difference between NET scores and student success.

Other than admission testing, additional studies focused on the correlation between admission grade point average (GPA) and its relation to student success (Crouch, 2015; Grossbach and Kuncel, 2011; Manieri et al., 2015; Salvatori, 2001). Grossbach and Kuncel (2011) and Crouch (2015) utilized descriptive studies of baccalaureate nursing students from the United States. The authors found that pre-nursing GPA was shown to have a weak positive relationship to a student's program completion GPA and NCLEX success, $r = 0.34$, 80% CI [0.21 to 0.47] (Grossbach and Kuncel, 2011); $r = 0.37$, $p \leq .001$ (Crouch, 2015). Moreover, Grossbach and Kuncel's (2011) meta-analysis concluded that a combination of standardized testing using the ACT and grades earned in a nursing program have a weak positive relationship to student success on the NCLEX, $r = 0.42$ and $r = 0.39$.

Studies have also examined additional indicators of student success beyond GPA and admission testing scores (Crouch, 2015; Grossbach and Kuncel, 2011; Jones-Schenk and Haper, 2014; McLaughlin et al., 2007; Megginson, 2009; Pitt et al., 2012; Schmidt and MacWilliams, 2011; Yin and Burger, 2003). Multiple studies have identified the need to look at the importance of the development of discipline specific nonacademic admission assessments; which should include variables such as interpersonal capacity, stress tolerance, personality, motivation, and attitude (Grossbach and Kuncel, 2011; Jones-Schenk and Haper, 2014; Megginson, 2009). Critical thinking (Crouch, 2015), personality, and behaviour (Pitt et al., 2012) have also been correlated to student success. Crouch's (2015) descriptive study found a weak positive correlation, $r = 0.25$, $p \leq .001$, between the Watson-Glaser Critical Thinking Appraisal (WGCTA), and nursing GPA. While Pitt et al. (2012) found similar significance in a descriptive integrative literature review, stating that academic performance is affected by not only critical thinking skills, but also personality and behaviour. Comparably, a systematic review of descriptive studies found that a combination of academic and nonacademic admission criteria is vital, compared to a single variable alone, in improving the process of student selection (Schmidt and MacWilliams, 2011).

3. Purpose of the Quality Improvement Project

The purpose of this quality improvement project was to determine the relationship between the current program admissions practices, including the admissions test and subsequent student success on the Canadian Practical Nurse Registration Examination (CPNRE). More specifically the aims of this project included: (a) assess the relationship between practical nursing program admission test scores and student success, defined by pass rates on the CPNRE, at a Canadian school of nursing; (b) determine if there is a correlation between program GPA and CPNRE success; (c) provide recommendations to the school's admission practices based upon admission data analysis and student success.

Table 1
Operational variables.

	Definition
Age	Age in years
Gender	Gender, coded 1 = male, 2 = female
Residency	Official residence, coded 1 = domestic, 2 = international
Program entry GPA	Students' grade point average, expressed as a percentage, when applying to the program
Program GPA	Final cumulative program grade point average, expressed as a percentage
Academic input/predictor variables (biology, chemistry, and math admission test result)	Results from admissions test, expressed as a percentage
Academic input/predictor variable, English admission test result[a]	Result from admission tests, expressed as a score, coded 1 = E01/E02, 2 = E11/E12/E13, 3 = W01/W02, 4 = W11/W12/W13, 5 = X00/X01
Sample 1A	Passed the CPNRE
Sample 1B	Failed the CPNRE
Outcome variable	CPNRE result, coded 1 = fail, 2 = pass

[a] 1 = E01/E02 (required to register for Introduction to College Reading and Writing), 2 = E11/E12/E13 (required to register for College Reading and Writing), 3 = W01/W02 (required to register for Introduction to College Writing Skills), 4 = W11/W12/W13 (required to register for Writing Skills for Practical Nursing), 5 = X00/X01 (exempt from English course).

4. Methods

4.1. Design

A quality improvement, longitudinal design using secondary data was utilized to determine factors, which predict CPNRE success. Practical nursing students are required to meet specific GPA admission requirements, as well as, complete a faculty developed admission test. The content of the admission test were developed by faculty experts with advanced degrees in their related fields. However, while content validity was established by the use of expert faculty, robust reliability measures currently do not exist for the admission test. The predictor variables in this project include program entry GPA, as well as the admission test components: English admission test result, biology admission test result, chemistry admission test result, and math admission test result. The outcome variable in this project was CPNRE result (Table 1).

4.2. Setting

The quality improvement project took place at a large publically funded academic institution located in southern Ontario, Canada. The practical nursing program admits an average of 225 first year practical nursing students yearly and graduates approximately 200.

4.3. Participants/Population Demographics

The target population for this project was a convenience sample of graduated practical nursing students, who had completed the CPNRE within 2014–2016. Individual demographics included age, gender and residency status. Inclusion criteria of the study population were all graduated practical nursing students who completed the program admission test preceding 2016. The population must have also completed the program and the CPNRE with consented, published results within 2014–2016. The population excluded from the study were those students who completed the program, wrote the CPNRE, but did not consent to having their examination results published. Additionally, those who did not complete the program, and consequently did not write the CPNRE, were excluded from the study.

4.4. Sampling

Throughout the 2014–2016 period, 574 practical nursing graduates wrote the CPNRE with consented published results. Of these, 503 passed the CPNRE and 71 failed the CPNRE. Calculations for sample size was based on the total eligible population for the group who passed (sample 1A) and who failed (sample 1B) the CPNRE between the years 2014–2016. Using a confidence interval of 95%, a 5% margin of error, a population size of 503, with a 50% survey response distribution, a minimum of 258 student records was required for sample 1A (Raosoft, 2004). In order to have an unbiased representation of the sample population, systematic random sampling was used for the selection of the student records. Every second record from the list of eligible records were reviewed until a minimum of 258 student records were obtained. For sample 1B, sample size was calculated using a confidence interval of 95%, a 5% margin of error, a population size of 71, with a 50% survey response distribution. A minimum of 35 student records were required for sample 1B. Likewise, using systematic random sampling, every second record from the list of eligible records were reviewed until a minimum of 35 student records were selected from the list of available records.

4.5. Measures

The institution uses a grading system, which ascribes student academic performance to a GPA expressed as a percentage on a 100-point scale. Biology, chemistry, and math admission test results are also expressed as a percentage. English admission test results are designed to place students in academic and program specific courses. These results are uniquely coded to the institution. The institution's practical nursing program considers program entry GPA and admission test results when offering program admission to applicants.

4.6. Data Collection

Data was obtained retrospectively for this project, and therefore informed consent was not necessary. The Canadian institutional research ethics board and University Health Sciences IRB approved this quality improvement project. Predictor variables (program entry GPA, and admission test scores for biology, chemistry, English and math) were sourced from the student information system, referred to as Banner (Ellucian, 2017). The primary outcome variable, CPNRE results (pass or fail), were provided by the College of Nurses of Ontario, and stored in print form within the school's Associate Dean's office. All data was collected by the project manager and entered into a Microsoft Excel spreadsheet for later transfer to Statistical Package for the Social Sciences (SPSS) database. In order to ensure data entry accuracy, 5% of the data was verified by the School of Health Sciences research assistant prior to SPSS entry. The research assistant has completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE) (Government of Canada, 2014). All data obtained and reported from institutional databases and documents was coded to ensure anonymity and was securely stored in a locked drawer in the project manager's desk. After a

10-year period, all data will be destroyed, in accordance with the conditions of the Tri-Council (Government of Canada, 2015b). Additionally, the data was reported and disseminated in aggregate form, whenever possible.

4.7. Data Analysis

Descriptive statistics were used to characterize and summarize the demographic data obtained from the record review. Missing data was managed by using SPSS pairwise deletion. Addressing the project's first aim, a hierarchical multiple regression analysis was performed to ascertain the effects of program entry GPA and admission test scores on the likelihood that students successfully pass the CPNRE. To address the project's second aim, the relationship between program GPA and CPNRE success was analyzed using the Independent *t*-test and the Cohen's *d* coefficient was used as an index to describe the magnitude of the effect with values of 0.20, 0.50, 0.80, corresponding with small, medium, and large respectively. Nominal data such as English admission test results were analyzed with a Chi-square of Independence and the *phi* coefficient (∅) was used as an index to describe the magnitude of the effect with values of 0.10, 0.30, and 0.50 corresponding to small, medium, and large respectively. IBM SPSS version 24 (Chicago, IL) was used for statistical analysis. Statistical significance is defined as $p \leq .05$.

5. Results

5.1. Demographics

For results on the outcome variable, there were 258 applicants who passed the CPNRE (sample 1A) and 35 applicants who failed the CPNRE (sample 1B). All 293 applicants were included in the analysis, 80.5% were female and 19.5% were male (Table 2). The predominant residency status of all applicants was domestic (94.9%). There was a mean age of 26.5 years ($SD = 8.46$) for applicants who passed the CPNRE and 27.2 years ($SD = 11.12$) for applicants who failed the CPNRE. There was no statistically significant difference in age between sample 1A and 1B, 1.26 and t(291) = −0.38, $p = .71$, 95% CI [−4.68, 3.20].

5.2. Academic Predictors

Of the four required components on the program admission test, three components were statistically and clinically significant for a pass on the CPNRE (sample 1A): mean biology admission test scores ($M = 74.96$, $SD = 11.22$), t(4.62) = 0.92, $p = .000$, 95% CI [5.32, 13.22], $d = 0.55$, mean chemistry admission test scores ($M = 67.23$, $SD = 8.38$), t(281) = 3.55, $p = .000$, 95% CI [2.40, 8.39], $d = 0.42$ and English admission test results (W11/W12/W13), χ^2 (4) = 14.48, $p = .006$, ∅ = 0.22. There was no statistically significant increase in pass on the CPNRE for math admission test results in samples 1A and 1B, t(281) = 1.88, $p = .091$, 95% CI [−0.20, 7.57], $d = 0.22$. However, the $d = 0.22$ does indicate a small clinically significant increase in pass on the CPNRE.

The analysis of program entry GPA showed an increase in mean GPA percentage for those in sample 1A as opposed to the applicants in sample 1B (75.54 ± 5.45 vs. 72.84 ± 4.90), which was statistically significant, t(240) = 2.81, $p = .01$, 95% CI [0.76, 4.62]. There was a statistically significant difference in pass rate for those with program entry GPA scores between 75 and 79.99%, t(240) = 2.60, $p = .01$, 95% CI [0.65, 4.73]. However, CPNRE outcome and program entry GPA were not statistically significant, χ^2 (6) = 9.97, $p = .13$.

5.3. Project Aim #1

A hierarchical multiple regression analysis was conducted to predict CPNRE results from program entry GPA, English test admission scores, biology admission test scores, chemistry admission test scores, and math admission test scores. Linearity was assessed by partial regression plots and a plot of regression-standardized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.11. There was homoscedasticity, as assessed by visual inspection of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values > 0.1, and variance inflation factor values were < 10. There were no studentized deleted residuals ± 3 standard deviations, no leverage values > 0.13, and values for Cook's distance above 1.

A forward selection process was used as the method of data entry. Each predictor variable was added one at a time, beginning with the variable with the highest correlation with the outcome variable (Table 3). In the first step of the hierarchical multiple regression, one predictor variable was entered (biology admission test result). This model was statistically significant, F change (1, 239) = 22.45, $p = .000$, $R^2 = 0.09$, explaining 9% of the variance in CPNRE outcome. At step 2, chemistry admission test result was entered also explaining a variance of 9%, this model was not statistically significant, F change (1, 238) = 1.84, $p < .176$, $R^2 = 0.09$. Step 3 introduced program entry GPA, which explained 9% of the variance in this model, F change (1, 237) = 0.24, $p < .628$, $R^2 = 0.09$. English admission test results were introduced in step 4, with a marginally higher than accepted level of significance, F change (1, 236) = 3.64, $p < .058$, $R^2 = 0.11$. At step 5, math admission test scores were introduced to the model, F change (1, 235) = 1.05, $p < .308$, $R^2 = 0.11$ (Table 4).

Model 1 suggests that the predictors of chemistry, English, math admission test scores, and program entry GPA did not have an effect beyond the effects of the model's predictors. In this model, the R^2 suggests that 9% of the variance can be explained, and 91% is not explained. In addition to a low R^2 value, there was one statistically significant standardized coefficient to signify a degree of change in the outcome variable for every change in the predictor. Biology admission test scores was both the strongest and statistically significant variable in predicting CPNRE pass in this model ($\beta = 0.293$, $p = .000$). Using a regression equation, predictions were made to determine CPNRE result for those biology admission test results one standard deviation away from the mean in either direction ($M = 74.96$, $SD = 11.22$). For a biology admission test score of 63.74%, CPNRE result was predicted as

Table 2
Demographic attributes of all applicants.

	N	%	Range	Minimum	Maximum	Mean	Std. Deviation
Gender	293					1.81	0.40
Male		19.5					
Female		80.5					
Residency	293					1.05	0.22
Domestic		94.9					
International		5.1					
Age	293		36	17	53	26.55	8.80
Program entry GPA	242		30.70	58.80	89.50	75.19	5.45

Table 3
Pearson correlation matrix for academic variables and CPNRE result.

	Program entry GPA (%)	English admission result categories	Biology admission test result (%)	Chemistry admission test result (%)	Math admission test result (%)	CPNRE result
Program entry GPA (%) (n = 242)	1	0.091	0.589**	0.529**	0.363**	0.174**
English admission result categories (n = 242)	0.091	1	0.025	−0.071	−0.021	0.111
Biology admission test result (%) (n = 241)	0.589**	0.025	1	0.455**	0.185**	0.293**
Chemistry admission test result (%) (n = 241)	0.529**	−0.071	0.455**	1	0.191**	0.208**
Math admission test result (%) (n = 241)	0.363**	−0.021	0.185**	0.191**	1	0.108
CPNRE result (n = 242)	0.174**	0.111	0.293**	0.208**	0.108	1

** Correlation is significant, $p \leq .01$ level (2-tailed).

1.81, 95% CI [62.44, 65.04]; for 74.96% it was predicted as 1.91, 95% CI [73.65, 76.27]; and for 86.18% it was predicted as 2.00, 95% CI [84.88, 87.48]; where the CPNRE result is coded as 1 = Fail, 2 = Pass (Table 5).

5.4. Project Aim #2

To determine if there was a relationship between program GPA and CPNRE success, an independent *t*-test was used. Analysis of program GPA and CPNRE results showed an increase mean GPA percentage between those who passed the CPNRE (sample 1A) and those students who failed the CPNRE (sample 1B) (74.71 ± 6.02 vs. 68.23 ± 4.80). The results were statistically significant for those who passed the CPNRE (sample 1A) with a mean program GPA (M = 74.71, SD = 6.02), t(291) = 6.11, p = .000, 95% CI [4.39, 8.57], d = 0.71. Furthermore, the d = 0.71 indicates a medium to large clinically significant increase in the pass rate.

6. Discussion

In this practical nursing program, admission decisions are based on program entry GPA, and the results of four admission test components. The results indicate that biology and chemistry admission test scores, as well as program entry GPA were positively related to CPNRE success. However, when trying to explain a statistically significant amount of variance in the CPNRE result, in consideration of all independent variables, the findings of this study indicate that mean biology admission test scores (M = 74.96) are a predictor of student CPNRE success. In spite of this, only 9% of the variance can be explained, and 91% is not explained. Conversely, when considering all academic variables, currently used at the school for admission consideration, only 11% of the variance can be explained, but were considered not statistically significant (Table 5).

Despite the biology admission test scores being both the strongest and statistically significant variable in predicting CPNRE pass (β = 0.293, p = .000), the model's variance is inconsistent with the findings in the literature of other program admission tests. Grossbach and Kuncel (2011) found that higher ACT scores accounted for 42% of the variance explained. Likewise, Manieri et al. (2015) concluded that HESI A^2 explained 16% of the variance. Inopportunely, students in both of these samples are representative of associate degree in nursing program. In spite of this, predictions could be made to determine CPNRE result from biology admission test scores alone.

By way of the literature, this project presents the current practices in place to aid in the selection criteria for nursing program admission. Regrettably, in Canada there is no conclusive evidence to suggest the use of a common admission test for practical nursing programs. The results of this project conclude that academic variables alone have a low percentage of the explained variance in student success, whereas a high percentage of the variance is not explained. This suggests that nonacademic factors are contributory, and should be considered in the school's admission practices. Implications for future research should include the identification and measurement of nonacademic factors, and their relationship to student success. Ultimately, the results of this project are supportive of the literature in using measures to assess nonacademic qualities of an applicant, such as: resilience, critical thinking, emotional intelligence, stress tolerance, personality, attitude, behaviour, and motivation (Crouch, 2015; Grossbach and Kuncel, 2011; Jones-Schenk and Haper, 2014; McLaughlin et al., 2007; Megginson, 2009; Pitt et al., 2012). In addition, the variables of chemistry and math admission test results have a small positive statistically significant relationship to CPNRE success, and could be used as a placement test score or for identification of at-risk-students.

Table 4
Model summary[f].

Model	R	R^2	Adj. R^2	Std. error of the estimate	R^2 change	F change	df1	df2	Sig. F change
1	0.293[a]	0.086	0.082	0.315	0.086	22.45	1	239	0.000
2	0.305[b]	0.093	0.085	0.315	0.007	1.84	1	238	0.176
3	0.306[c]	0.094	0.082	0.315	0.001	0.24	1	237	0.628
4	0.328[d]	0.108	0.092	0.313	0.014	3.64	1	236	0.058
5	0.334[e]	0.111	0.093	0.313	0.004	1.05	1	235	0.308

[a] Predictors: (Constant), Biology Admission Test Result (%)
[b] Predictors: (Constant), Biology Admission Test Result (%), Chemistry Admission Test Result (%)
[c] Predictors: (Constant), Biology Admission Test Result (%), Chemistry Admission Test Result (%), Program Entry GPA (%)
[d] Predictors: (Constant), Biology Admission Test Result (%), Chemistry Admission Test Result (%), Program Entry GPA (%), English Admission Result Categories
[e] Predictors: (Constant), Biology Admission Test Result (%), Chemistry Admission Test Result (%), Program Entry GPA (%), English Admission Result Categories, Math Admission Test Result (%)
[f] Outcome Variable: CPNRE Result

Table 5
Descriptive statistics for the variables in the model.

	Mean	Std. deviation	N
CPNRE result			293
Program entry GPA (%)	75.19	5.45	242
English admission test result			292
Biology admission test result (%)	74.96	11.22	283
Chemistry admission test result (%)	67.23	8.38	283
Math admission test result (%)	77.20	10.72	283

7. Conclusion

The project's findings highlight the need for a practical nursing program admission test, which considers not only academic, but also non-academic attributes. Moreover, appropriate student selection may support an increase in the numbers of successful new nursing registrants graduating from Canadian regulated nursing programs (Canadian Institute for Health Information, 2015). Nevertheless, some limitations of this project exist. The admission testing data and CPNRE outcome were limited to those graduates who disclosed published results. Additionally, the faculty developed admission test is only used at this one particular school, thus limiting the generalizability of the findings to other practical nursing programs with similar demographics. Lastly, the author acknowledges the many nonacademic variables that could affect CPNRE success. The findings of this project were discussed with the institutions stakeholders to plan for subsequent research, or phases of this project to address nonacademic admission assessments and their relationship to student success.

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