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10-21-2011

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Recommended Citation
Levine, Gavrielle and Bellefleur, Carmelle, "Do PAX-RN Scores Predict First Year Success in Nursing School for Minority Disadvantaged Students?" (2011). *NERA Conference Proceedings 2011*. Paper 11.
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Do PAX-RN Scores Predict First Year Success in Nursing School for Minority Disadvantaged Students?

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Paper presented at the 42nd Annual Conference of the

Northeastern Educational Research Association (NERA)

October 20, 2011, Rocky Hill, Connecticut

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Abstract

The National League for Nursing developed the *Pre-Examination for RN Programs* (*PAX-RN*) to predict academic success for applicants at the completion of the first year of nursing programs. While the *PAX-RN* is normed on a stratified sample, the effectiveness of this test in predicting academic success for minority disadvantaged students is unclear. A cohort of 41 predominately minority students (56.1%) enrolled in an Associate Degree nursing program in an urban environment completed the *PAX-RN* as part of the admission process. As predicted, verbal and composite scores were significantly higher for students who passed the first semester nursing course than for those who failed. However, there were no significant differences in mean scores for students at the completion of the first year. These first-year results should be considered with caution due to the small sample size. Future research is needed to identify those factors predicting academic success for minority disadvantaged students.

Standardized tests are a frequently-used component of the admission process for higher education programs (Burton & Ramist, 2001; Camera & Kimmel, 2005; National Association for College Admission Counseling, 2008). The National League for Nursing developed the *Pre-*

Examination for RN Programs (*PAX-RN*) to provide information predicting academic success during the admission process to nursing programs. While the *PAX-RN* is normed on a stratified sample, the effectiveness of this test in predicting academic success for minority disadvantaged students is unclear. Minority students have been found to have lower retention and success rates in nursing programs than non-minority students (Gardner 2005). Project STAR (Bellefleur et al. 2009) was implemented with students in a nursing program to provide academic and financial support to minority disadvantaged students with the goal of improving their success in the program. This study examines the predictive value of the *PAX-RN* for minority disadvantaged students enrolled in a nursing program that results in an Associate Degree.

The *National League for Nursing Pre-Admission Examination for RN Programs* (*PAX-RN*)

The *National League for Nursing Pre-Admission Examination for RN Programs* (*PAX-RN*) is a standardized multiple-choice test developed by the National League for Nursing to predict academic success in nursing programs (NLN Testing Services, 2010). The examination is comprised of three subtests in areas identified as important to academic success in a nursing program: Verbal Ability, Math, and Science. A weighted Composite score is also reported. Test-retest reliability, measured using the Pearson Product-Moment Coefficient, was 0.864 (n=85) (NLN Testing Services, 2010). Internal consistency of the tests measured using the Kuder-Richardson index of item homogeneity (KR-20) (n= 23,034) was strong for verbal ability (.82) and mathematics (.81) and good for science (.75) (NLN Testing Services, 2010). A criterion-related validity study (n=2302) using applicants to predominately public institutions (75.8%) offering Associate Degrees (80.3%) showed significantly higher test score means for students

who completed the first year of the program than for those who did not (Wetherby, 2007). For applicants to all degree-granting nursing programs, the resulting correlation between PAX-RN composite scores and completion of the first year of the nursing program was only 0.36 (n=2200) (Wetherby, 2007). This low correlation accounts for only 13% of the variance in first year completion rates.

Students

A cohort of 45 students participating in Project STAR was enrolled in a nursing program leading to an Associate Degree in an urban environment. Most students were female (n=36, 80%), minority (See Table One), non- native English speakers (n=25, 55.6%), and the first people in their families to attend college (n=32, 71.1%). More than one-third of the students completed remedial courses prior to beginning the nursing program (n=17, 37.8%). *The No Child Left Behind Act* (2001, 2002) identifies academically disadvantaged students as those required to complete remedial courses and/or ESL courses in preparation for participating in an academic program. Most of the students in this cohort completed remedial and/or ESL courses prior to beginning the nursing program.

Table One

Ethnicity of Students Enrolled in the Nursing Program (n=45)

Ethnicity	Number	Percent of cohort
African-American	17	37.8%
Asian	6	13.3%

Hispanic, Latino/a	9	20%
White	13	28.9%

During each semester of this two-year nursing program resulting in an Associate Degree, students enroll in one nursing course. The first semester course is NUR101 followed by NUR105 in the second semester. Students must successfully pass each course to enroll in the successive course.

Of the 45 students in the cohort, 36 (80%) successfully completed the first semester course, NUR101. One of the successful students withdrew, so that 35 students enrolled in NUR105, the second-semester course. Of these 35 students, 27 students (77.1%) successfully completed the second semester course. At the conclusion of the first year of the Nursing program, 27 students (60% of the original cohort of students) successfully completed both courses.

As part of the enrollment process, 41 students in this cohort completed the *PAX-RN*. Most of these 41 students were female (n=33, 80.5%), minority (see Table Two), non-native English speakers (n=23, 56.1%), and the first generation in their family to attend college (n=29, 70.7%). More than one-third of these students completed remedial courses (n=14, 34.1%). Statistical tests were conducted to determine if the group of students who completed the test was different from the group who did not. No significant differences were found between these two groups in distributions of gender, ethnicity, native English speaking, first-generation to attend college, or enrollment in remedial courses. Therefore, the students who completed the PAX-RN are considered representative of the entire student cohort.

Table Two

Ethnicity of Students Enrolled in the Nursing Program Who Completed the PAX-RN (n=41)

Ethnicity	Number	Percent of cohort
African-American	14	34.1%
Asian	6	14.6%
Hispanic, Latino/a	9	22.0%
White	12	29.3%

For each of the three tests comprising the PAX-RN and the Composite score, the Mean as well as the Median scores of the students in the cohort exceeded the theoretical average (See Table Three).

Table Three

Mean and Median Raw Scores for the Cohort (n=41)

Test	Mean	Median	Standard Deviation	Possible Range
PAX-RN Verbal Raw Scores	35.68	36.00	11.253	0 to 60
PAX-RN Math Raw Scores	22.05	25.00	9.055	0 to 40
PAX-RN Science Raw Scores	32.34	32.00	9.650	0 to 60

PAX-RN Composite Raw Scores	105.68	109.00	23.563	0 to 200

Average *PAX-RN* percentile scores for the 41 students in the cohort who completed the test were almost at the 50th percentile for each subtest when compared to other applicants to Associate Degree nursing programs. The Composite percentile for these students was higher than average (See Table Four). These scores suggest that this cohort of students is capable of achieving within the normal range.

Table Four

Percentiles comparing student *PAX-RN* scores to all students applying to Associate Degree nursing programs for students in the cohort (n=41)

Test	Mean	Median	Standard Deviation	Possible Range
PAX-RN Verbal Percentile	49.78%	49.00%	33.545	0 to 100%
PAX-RN Math Percentile	49.20%	63.00%	34.886	0 to 100%
PAX-RN Science Percentile	48.93%	46.00%	30.801	0 to 100%
PAX-RN Composite Percentile	57.63%	66.00%	33.854	0 to 100%

Method

The cohort of students enrolled in the nursing program was divided into two groups: students who passed or who failed the two nursing courses during the first year of the program. In addition, students who passed or failed each course were identified. Test score results of the

PAX-RN were compared for students who passed or failed each of the nursing courses during the first year of the program. In addition, test scores for those who started and completed the first year of the program were compared with those who started but did not complete the first year of the nursing program to see how accurately the test predicts student performance for this predominately minority disadvantaged cohort of students.

Results

For the 41 students who completed the *PAX-RN*, average raw scores for each subtest and for the composite score were higher for students who passed the first semester nursing course (NUR101) than for those who failed it (See Table Five). However, these differences were significant only for the Verbal Ability raw score ($t(39)=-2.461$, $p < .05$) and the Composite raw score ($t(39)= -2.198$, $p < .05$). Percentiles comparing student scores to all students applying to Associate Degree nursing programs also showed consistently higher scores for those students who passed the first semester course than for those who did not (See Table Five). Again, these differences were significantly different only for the Verbal Ability scores ($t(39)=-2.473$, $p<.05$) and Composite scores ($t(39)= -2.242$, $p<.05$). Given the small sample size the significant results highlight the importance of these scores.

Table Five

Mean Raw Scores and Percentiles comparing student *PAX-RN* scores to those of all students applying to Associate Degree nursing programs for students enrolled in NUR101 (n=41)

Test	NUR 101	n	Mean Raw Score (SD)	Percentile(SD)

PAX-RN Verbal	Passed Course	32	37.84 (10.40)	56.25%(31.34)
	Failed Course	9	28.00 (11.40)	26.78%(32.51)
PAX-RN Math	Passed Course	32	22.94 (8.96)	53.28%(34.00)
	Failed Course	9	18.89 (9.21)	34.67%(36.08)
PAX-RN Science	Passed Course	32	33.59 (9.90)	53.69%(30.64)
	Failed Course	9	27.89 (7.56)	32.00%(26.31)
PAX-RN Composite	Passed Course	32	109.78(22.28)	63.63%(32.58)
	Failed Course	9	91.11(23.37)	36.33%(31.04)

Only those students who successfully completed the first semester course (NUR101) were permitted to continue in the second semester course (NUR105). In addition, one passing student withdrew from the program. Thirty-two students enrolled in the second semester nursing course (NUR105). When test scores of students who passed this second course were compared with those who did not pass, there were no significant differences in raw test scores or percentiles comparing these students to all students in Associate Degree nursing programs. These results should be considered with caution due to the small sample size.

PAX-RN test results for students who completed the first year in the nursing program were compared with test scores of those who did not complete the first year of the program. No significant differences in raw scores or percentiles were found between these two groups. These results should be considered with caution due to the small sample size.

Conclusion

The *PAX-RN* purports to predict first year applicant success in nursing programs. The results of this study show that the *PAX-RN* Verbal Ability test and the Composite Score predicted minority disadvantaged student success in the first semester of a two-year nursing program resulting in an Associate Degree but did not predict success in the second semester or the first year of the program. Students in this study participated in academic support before beginning the nursing program and had access to academic support hours throughout the semester. In addition, stipends were distributed to many students. These academic supports may account for differences in verbal ability scores. Despite the small sample size, there were significant differences between students who passed and who failed the first semester nursing course in *PAX-RN* scores of Verbal Ability and the Composite Score. The non-significant results found in this study should be viewed with caution due to the small sample size. Increasing the sample size would clarify the predictive value of the *PAX-RN* for minority disadvantaged students. This study demonstrates that for minority disadvantaged students the *PAX-RN* predicts academic success for the first semester of the nursing program but may not for the first year of the program. Future research is needed to identify those factors that predict academic success for minority disadvantaged students.

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