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▲ From Admission to Graduation: The Impact of Gender on Student Academic Success in Respiratory Therapy Education

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Despite research in other allied health professions and medicine, the influence of gender on student performance in respiratory therapy (RT) academic programs and on the National Board for Respiratory Care (NBRC) examinations is unknown. Therefore, the purpose of this study was to identify the impact of gender on student academic performance from admission to graduation and to determine whether gender differences affected student success on the NBRC examinations. This study consisted of a retrospective analysis of 91 female and 22 male graduates at a southeastern U.S. university between 2003 and 2007. The variables of academic success included the students' entering GPA, exit GPA, and first-attempt performance on the Certified Respiratory Therapy (CRT) examination and on the Written Registry for Respiratory Therapy (WRRT) examination. Independent sample *t*-test and paired sample *t*-test analyses at a level of significance of $\alpha = 0.05$ were utilized. No significant gender differences were observed in the measures of students' entering GPA, exit GPA, or performance on scaled CRT and WRRT examinations ($p > 0.05$). When we compared entering GPAs and exit GPAs, a statistically significant difference was found ($p < 0.05$). Both male and female RT students had significantly higher exit GPAs than entering GPAs. The results of the study showed that gender plays no role in the academic success of RT students. When looking at the changes on academic success, we conclude that RT students work hard, as the graduation scores are higher than admission scores. *J Allied Health* 2010; 39(3 pt 1):175-178.

AS HEALTHCARE PROFESSIONS increasingly offer a variety of more opportunities and excellent job security, they become more attractive as a career to young people. Although women represent the majority of healthcare professionals across the nation, more men now choose to pursue

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various healthcare professions.¹⁻⁵ Controversy has arisen on gender difference in student success in healthcare professions, whether the differences exist due to prejudices in pedagogy, or if they exist at all. Whereas several older studies have indicated that female students fall behind their male peers in academic performance and on licensure examinations,⁶⁻¹¹ more recent studies have reported that there is no gender gap between male and female students.¹²⁻¹⁶

Though there is copious evidence in the literature regarding gender difference in student academic success in other healthcare professions, no studies have looked at the relationship between students' gender and academic performance in respiratory therapy (RT) education. Therefore, the purpose of this study was to identify the impact of gender on student academic performance (from admission to graduation) and to determine whether or not there are gender differences in student success on the National Board for Respiratory Care (NBRC) examinations. Upon investigating what has been written about gender differences in RT education, the following important questions arose:

1. Do female and male students significantly differ in their academic performance both before admission and by the time they graduate?
2. Is there any significant difference between students' admission and graduation GPA measures?
3. Does gender have an impact on student performance on the NBRC examinations?

Methods

SAMPLING AND DATA COLLECTION

Using existing records of all graduates, a longitudinal database was created for this study. Files of RT graduates from a southeastern U.S. university (Georgia State University) were reviewed with the purpose of identifying the impact of gender on student academic performance from admission to graduation. Student age and previous college experience were determined based on student application forms. Students who had previous college experience and who were more than 30 yrs of age at the time of admission were excluded from this study. After controlling variables such as age and previous college experience, this study consisted of a retrospective analysis of 91 female and 22 male students who graduated from a Georgia State University between

TABLE 1. Mean \pm SD of Student Entering GPA, Exit GPA, CRT, and WRRT Scores by Gender

Variables	n	Entering GPA	Exit GPA	CRT Scores	WRRT Scores
Female	91	3.00 \pm 0.36	3.17 \pm 0.28	81.32 \pm 5.40	74.71 \pm 6.93
Male	22	2.87 \pm 0.37	3.08 \pm 0.24	81.54 \pm 4.40	75.77 \pm 4.01

2003 and 2007. IRB approval was not needed for a longitudinal retrospective study design.

VARIABLES

The criterion measures of academic performance included the students' entering grade-point average (GPA), exit GPA, and first-attempt, scaled scores on the Certified Respiratory Therapy (CRT) and the Written Registry for Respiratory Therapy (WRRT) examinations. Whereas the entering GPA reflects student academic standing before enrollment in the RT program, the exit GPA indicates student GPA measures at graduation. The two required NBRC examinations were included in the study because they assess the knowledge, skills, and abilities of students to provide quality patient care.¹⁷⁻²² The independent variable in this study was student gender.

DATA ANALYSIS

In order to analyze the gender differences on academic success and student performance (entering GPA, exit GPA, and on the CRT and WRRT examinations), differences between pairs of mean were investigated by using independent sample *t*-tests. Paired sample *t*-test analyses were used to determine if there was a significant difference between student's entering-GPA and exit-GPA scaled scores. Student data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows, version 14.0 (SPSS Inc., Chicago, IL). A standard $\alpha = 0.05$ level of significance was chosen for all of the statistical analyses.

Results

In response to our first research question, two separate sets of independent *t*-tests were conducted to determine the influence of gender on student academic performance at the time of admission and at graduation. Although the female students had slightly higher entering GPAs and exit GPAs than their male counterparts, neither of these results were statistically significant ($p > 0.05$). Table 1 presents the mean and standard deviations (SD) of students' entering GPA and exit GPA measures by gender.

Our second research question regarded the difference between students' academic performance at admission and at graduation. It was answered with the analysis of student data using two separate sets of dependent *t*-test. As shown in Figure 1, the exit GPA measures of both male and female students were significantly higher than the averages of entering GPA ($p < 0.05$).

Regarding the third question, two separate sets of independent *t*-test were performed to determine the impact of gender on student performance on the NBRC examinations. According to the statistical comparisons, no significant gender difference was observed in either the scaled CRT or WRRT examinations ($p > 0.05$). Table 1 presents the mean and SDs of student CRT and WRRT scores.

Discussion

Due to the growing need for respiratory therapists,²³ RT is a path commonly chosen by male and female students. Although respiratory therapy remains a traditionally female profession, this is the first study assessing the influence of gender on student academic performance as well as performance by gender on the NBRC examinations. Therefore, it sets a starting point for understanding gender difference in student academic performance from admission to graduation in RT education.

This study indicates that there is no significant gender difference on student academic performance in RT education. No significant differences were observed in this study between male and female students in the measures of student entering GPA or exit GPA. Additionally, student performance on the scaled CRT and WRRT examinations did not differ statistically by gender ($p > 0.05$). The findings of this study are consistent with recent similar research that has been performed in medicine and in allied healthcare professions.¹²⁻¹⁶

Eliminating stereotypes and treating students equally will advance the RT profession as a whole by including worthwhile contributors from both genders. Because the data in this study were drawn from a single RT program at a Southeastern University, the findings indicate that all students in the program were placed on an equal plane without a pattern of male or female advantage. When an RT program establishes a gender-balanced educational framework, it promotes an equality that students will take with them into the field.

More broadly, student success in RT is important because of the time, money, and other resources spent in providing an educational experience conducive to learning for students.¹⁸ Other studies have shown that students who thrive in RT programs have a better chance of passing the NBRC examinations.^{17,20,21,24} The second finding of this study indicates that when the entering- GPA and exit GPA of both female and male students were compared separately, the exit GPA measures of both genders are significantly higher than entering GPA ($p < 0.05$). One could argue that the RT program used in this study

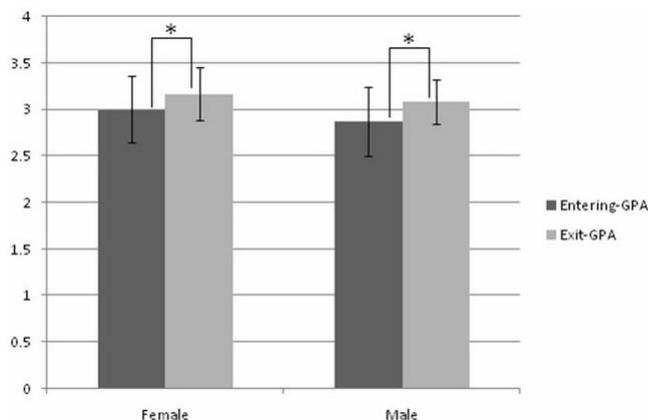


FIGURE 1. Distribution of entering and exit GPA measures for female and male RT students. Error bars show SD, and the asterisks indicate significant difference ($p < 0.05$).

is extremely easy when entering GPA is compared with exit GPA. Every year, the RT students in the program perform extremely well on the NBRC examinations, including the CRT, the WRRT, and clinical simulation examinations. Due to the graduation requirements established by the program, all of the students take the NBRC examinations before their graduation and 90% to 100% of them pass the NBRC examinations on their first attempts. Therefore, the differences in student GPAs do not indicate that the program is extremely easy. This actually supports the idea that the students work harder once they are admitted.

RT is a predominantly female profession. Therefore, the majority of the sample in this study consisted of female participants consistent with the previous literature in respiratory care education.^{25–28} Although the sample sizes are unequal in this study, the standard deviations are similar enough to assume equal variances that validate the findings of the study.

These outcomes have important implications for RT education programs. First, RT programs should maintain an admission process that gives equal opportunities to both female and male applicants. Second, through periodic research and evaluation of student performance, program directors need to understand the effect of gender on the success of their students. If they determine that a gender gap exists, they should identify the causes and evaluate whether instructional modifications are needed to accommodate the gender differences in RT education by addressing special resources toward students. These modifications include, but are not limited to, tutoring, special attention, and additional preparation for the NBRC examinations, thereby increasing student success in the program and on the NBRC examinations.

The main limitation of our study is that it focused on RT programs only and may not represent allied health education programs overall. Therefore, further research studying multiple fields simultaneously is needed to establish a more

general picture of how gender impacts student success in nursing, physical therapy, and other healthcare education programs.

Conclusion

The results of the study showed that gender in itself plays no role in the academic success of RT students. Also, we conclude that RT students work harder once admitted to the program due to the fact that the sample's graduation GPAs were much higher than its admission GPAs.

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