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Factors Influencing Student Success in Associate Degree Respiratory Therapy Programs

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Factors Influencing Student Success in Associate Degree Respiratory Therapy Programs

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Abstract

Purpose: Research suggests behavioral, personal, and environmental factors each appear to influence student success; however, the results are inconclusive. The purpose of this study was to identify factors influencing student success in associate degree respiratory therapy programs by analyzing existing educational data from student records.

Method: A convenience sample of students enrolling in the eight associate degree respiratory therapy programs of a large community college system in the Midwestern United States during 2016 and 2017 (N = 226) was utilized. Historical data from student records were categorized as either a behavioral, a personal, or an environmental factor, and then were analyzed to determine the influence of each factor on student success, defined as degree completion.

Results: Binary logistic regression (BLR) models demonstrated significant predictive relationships between specific behavioral factors, personal factors, and environmental factors and degree completion. Significant predictors of degree completion included the following: grade in first program course, first program term and end of first term cumulative grade point averages (GPAs), and failing a required program course (behavioral factors); student age, ethnicity, and gender (personal factors); and campus of attendance and advising model (environmental factors).

Discussion: Results suggest specific behavioral factors, specific personal factors, and specific environmental factors each appear to influence student success, providing additional clarity to results found in the literature. Practical implications for leaders and for future research on student success are discussed.

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Keywords: Student success; Community college degree completion; Respiratory therapy education; Educational leadership; Binary logistic regression

1. Introduction

Responding to increasing calls from state legislatures to improve student retention and completion is a common challenge for leaders of post-secondary institutions,[1] and despite some recent increases, retention and completion rates remain low.[2] Student completion is a critical leadership problem for directors of

respiratory therapy education programs, as completion rates are not improving.[3] Extensive research has been conducted on college student success and completion; however, research in allied health programs has been limited and focused primarily on programs in nursing, dental hygiene, physical therapy, and surgical technology.[4] Few studies have examined student success in respiratory therapy programs and even fewer examined associate degree programs.

Triadic reciprocal causation (TRC) theory suggests human functioning results from the reciprocal interplay of behavioral, personal, and environmental factors.[5] Previous studies examining factors influencing student success suggested behavioral, personal, and environmental factors each appeared to influence student success; however, the results were inconsistent. Additionally, the influences of age or gender were not evaluated.[4,6–11]

Behavioral factors appearing to influence student success positively included mathematics preparation and early registration,[6] participating in direct (group-oriented) mentoring,[9] completing technical dual credit as high school students,[12] conscientiousness,[13] Emotional Intelligence (EI),[14] and meeting with an academic advisor.[15] Behavioral factors appearing to influence success positively in allied health programs included grade point average (GPA) and standardized test scores,[16–18] motivation, knowledge of the profession, work ethic, and interpersonal skills[17]; high school achievement and performance, aptitude, and proactive measures taken by students.[19] In respiratory therapy programs, behavioral factors appearing to influence student success positively included total proportion of prerequisites completed prior to entering the program[20]; GPA and perception of academic ability[21]; and abilities to work under stress, to utilize effective time management, to exercise independent judgement, to assume responsibility, and to follow course sequencing.[3]

Personal factors appearing to influence student success positively included social capital,[6] support from family and peers,[8] and feelings of connectedness and belonging.[9] No personal factors were identified as appearing to influence student success positively in allied health programs or in respiratory therapy programs.

Environmental factors appearing to influence student success positively included providing effective advising,[10] specifically by a professional advisor,[22] academic, social, and personal support, assessing activities and providing frequent feedback, engaging students with other students, faculty, and staff in activities promoting student learning—specifically in the classroom; 10 special support programs, and student success courses—[23] specifically with contextualized content, taught by full-time faculty members[24]; and employing faculty members (as leaders) understanding and adapting to the followership styles of students.[25] In allied health programs, utilizing reference letters and requiring clinical observations as a part of the application process, and including a foreign language in program prerequisites appeared to influence student success positively.[4] In respiratory therapy programs, factors appearing to influence student success positively included having experienced preceptors in the clinical setting, specifically for students identifying as Black or African American[26]; specific program director leadership style[27]; higher levels of financial and personnel program resources[28]; and utilizing contract learning[29] and problem-based learning (PBL) in courses.[30]

Behavioral factors appearing to influence student success negatively included having a sense of entitlement and lacking motivation[9]; and registering late for classes, demonstrating a lack of conscientiousness.[6] In allied health programs, behavioral factors appearing to influence student success negatively included making the wrong career choice, having an inability to see career pathways, lacking connection with faculty, and being academically unprepared.[31] No behavioral factors were reported as appearing to influence student success negatively in respiratory therapy programs.

Personal factors appearing to influence student success negatively included financial obligations[6,9,32] and home crisis and trauma.[9] In allied health programs, personal factors appearing to influence student success negatively included social unpreparedness and financial and personal stressors,[30] and Black ethnicity.[33] In addition, students, identifying as Black or African American, attending a respiratory therapy program at a Historically Black College and University (HBCU), identified social and economic obstacles as impacting student success negatively, with specific challenges including being employed while attending school and lacking transportation and childcare.[26]

Environmental factors appearing to influence student success negatively included inappropriately placing minority students in developmental courses upon entering college[11] and having mismatches between instructors' pedagogical styles and students' levels of self-direction, based on Hersey and Blanchard's *Situational Leadership Model*.[34] In allied health programs, lacking support from faculty appeared to influence student success negatively.[30] In respiratory therapy programs, having program directors with a passive management-by-exception

leadership style appeared to influence student success negatively.[27]

Although research suggested behavioral, personal, and environmental factors each appeared to influence student success, the research was inconsistent. In addition, research focusing specifically on student success in respiratory therapy programs has been limited to baccalaureate and graduate programs. Clearly, more research is needed to determine what influences student success ultimately, and program directors, as leaders, have an ethical responsibility to be attentive to the needs and concerns of students, as followers.[35] In an attempt to provide additional clarity and to address gaps in the literature related to associate degree respiratory therapy programs, the purpose of the study was to identify behavioral factors, personal factors, and environmental factors influencing student success in associate degree respiratory therapy programs.

2. Method

2.1. Overview

The dependent variable, student success, was defined as degree completion, determined by the respiratory therapy program curriculum. Degree completion, and specifically on-time degree completion, is a leadership challenge for program directors, because maintaining ongoing academic program accreditation through the Committee on Accreditation for Respiratory Care (CoARC) requires respiratory therapy programs maintain a three-year average on-time degree completion rate of 70%.[36] It should be noted, students withdrawing from programs voluntarily and students transferring to other degree programs within the same academic institution are excluded from this on-time completion rate calculation; however, program attrition remains a leadership challenge for program directors.

2.2. Participants

The study utilized a convenience sample of students (N = 285) enrolling in the eight associate degree respiratory therapy programs of a large community college system in the Midwestern United States during 2016 and 2017. The rationale for utilizing these two cohorts of students as participants was the introduction of the most-recently revised curriculum in fall 2016 and anecdotal observations by program directors in the community college system of

increased attrition and of delayed completion, beginning during this period.

2.3. Materials and procedure

2.3.1. Overview

The quantitative research method of collecting and analyzing existing educational data from student records was used in the study.[37] It was proposed the results of the research could be used to attempt to provide additional insights into predicting student success in associate degree respiratory therapy programs, utilizing behavioral factors, personal factors, and environmental factors. Archived student data were collected from institutional databases, using a quasi-experimental design, applying an experimental mode of analysis and interpretation to data not meeting the full requirements of experimental control, because participants were not assigned randomly to treatment conditions.[38]

The student information system (SIS) platform recorded 312 data fields as potential variables for each participant. These potential variables were reduced by eliminating duplicate fields, eliminating fields not adding unique participant information, and eliminating fields with apparently insignificant information or representing a small number of participants (name of high school and county of residence, for example). These reductions generated a total of 19 unique variables. Participants with missing data, likely resulting from SIS data entry errors or from participants' omission on the college application, were excluded from the study, resulting in a final sample of 226 participants.

2.3.2. Independent variables

Each of the 19 unique variables was categorized as either a behavioral, a personal, or an environmental factor for analysis. Behavioral, personal, and environmental factors are included in Table 1.

2.4. Statistical analysis

The data analysis plan created binary logistic regression (BLR) models, using IBM® SPSS Statistics 26, to predict the likelihood of participants completing the program and to determine the influence each variable has on degree completion. Developing BLR models using SPSS appeared to be an appropriate analysis methodology, as the data analysis design was aligned with tenets of BLR:

Table 1
Behavioral, personal, and environmental factors.

Behavioral Factors		Personal Factors	Environmental Factors
• type of admission (first-time, transfer, or readmission) • years between first enrollment at the college and program cohort enrollment (calculated from other fields) • grade earned in first program course • first program term GPA • end of first program term cumulative GPA • total credits earned at end of first program term	• accessing Learning Management System (LMS) during first program course • failing one or more general education courses • failing one or more program courses (after initial program course • number of advising sessions attended during first program term	• age at enrollment in first program course • ethnicity • gender • Veterans Administration (VA) benefit-eligibility status • U. S. citizenship	• campus of enrollment • cohort year • first program course taught by full-time or part-time faculty member • professional advisor or full-time faculty member advisor

1. The dependent variable is dichotomous.
2. Levels of the dependent variable represent membership in one of two groups.
3. Group membership is mutually exclusive.
4. The goal is to predict group membership based on a set of predictors.[39]

The initial, base BLR model was created, using all independent variables together, to determine if an overall significant relationship existed between the variables and degree completion, which would suggest the model predicted success or non-success better than chance. Next, additional BLR models were created for each variable (classified as either a behavioral factor, a personal factor, or an environmental factor), comparing participants completing the program and participants not completing the program, resulting in three sets of BLR equations. Certain variables were binomial by nature (cohort, gender, and advising model, for example), so no additional coding was required. However, for all other variables not binomial by nature, dummy binomial variables were created prior to analysis, resulting in a total of 54 variables.

3. Results

3.1. General

Overall, 67.7% (n = 153) of participants completed degree requirements. The base BLR model demonstrated the variables predicted participant outcome with 90.7% accuracy overall, 96.7% for participants completing degree requirements, and 78.1% for participants not completing degree requirements,

suggesting the model predicts success or non-success better than chance. BLR equations for individual variables demonstrated significant predictive relationships between specific behavioral factors, specific personal factors, and specific environmental factors and degree completion ($p < 0.05$).

3.2. Behavioral factors

BLR equations demonstrated significant predictive relationships between specific behavioral factors and degree completion: grade in first program course, first program term and end of first term cumulative GPAs, and failing a required program course (Table 2). There was no significant predictive relationship established between type of admission to the college, number of years between first enrollment at the college and program cohort enrollment, total credits earned by the end of the first program term, accessing the Learning Management System (LMS) during the first program course, number of advising sessions attended during first program term, or whether or not the participant failed one or more general education courses and degree completion.

Participants earning a grade of A in the first program course were 3.74 times more likely to complete than participants earning other grades, and participants earning a grade of B in the first program course were 4.224 times more likely to complete. Participants earning a grade of F in the first program course were 2.795 times less likely to complete. No significant relationship between earning a grade of C, D, FW, or W in the first program course and degree completion was established.

Table 2
Statistically significant behavioral variables.

	Grade in first program course					
	A		B		F	
n	38		99		15	
Completing	33		83		2	
Not Completing	5		16		13	
Completion %	86.84%		83.84%		13.33%	
	B	S.E.	Wald	df	Sig.	Exp(B)
A	1.319	.503	6.868	1	[a].009	3.740
Constant	.568	.152	14.002	1	.000	1.765
B	1.441	.326	19.515	1	[a].000	4.224
Constant	.205	.178	1.326	1	.250	1.228
F	−2.795	.775	13.013	1	[b].000	.061
Constant	.923	.153	36.575	1	.000	2.517

	GPA during first program term			
	<1.0	2.50−2.99	3.0−3.49	>3.50
n	32	40	62	34
Completing	2	35	52	29
Not completing	30	5	10	5
Completion %	62.5%	87.5%	83.87%	85.29%
	B	S.E.	Wald	df	Sig.	Exp(B)
<1.0	−3.964	.750	27.901	1	[b].000	.019
Constant	1.256	.173	52.805	1	.000	3.512
2.5−2.99	1.395	.502	7.727	1	[a].005	4.034
Constant	.551	.152	13.106	1	.000	1.735
3.0−3.49	1.177	.381	9.548	1	[a].002	3.244
Constant	.472	.161	8.643	1	.003	1.603
>3.5	1.157	.507	5.204	1	[a].023	3.181
Constant	.601	.151	15.851	1	.000	1.824

	Cumulative GPA end of first program term		
	2.0−2.49		3.0−3.49
n	45		62
Completing	29		52
Not completing	16		10
Completion %	64.44		83.87%
	B	S.E.	Wald	df	Sig.	Exp(B)
2.0−2.49	−1.178	.390	9.115	1	[b].003	.308
Constant	.927	.159	33.874	1	.000	2.527
3.0−3.49	.630	.306	4.251	1	[a].039	1.878
Constant	.515	.175	8.621	1	.003	1.673

	Failing a required program course after first course
n	19
Completing	3
Not completing	16
Completion %	15.79%
	B	S.E.	Wald	df	Sig.	Exp(B)
Failed	−2.642	.648	16.612	1	[b].000	.071
Constant	.968	.156	38.670	1	.000	2.632

[a] Denotes a significant predictive relationship between variable and completion ($p < 0.05$).
[b] Denotes a significant predictive relationship between variable and non-completion ($p < 0.05$).

Table 3
Statistically significant personal variables.

| | | | Age at program admission | | | |
			25–29			40–44
n			47			23
Completing			38			9
Not completing			9			14
Completion %			80.85%			39.13%
	B	S.E.	Wald	Df	Sig.	Exp(B)
25-29	.854	.402	4.512	1	*.034	2.350
Constant	.586	.156	14.122	1	.000	1.797
40-44	−1.334	.454	8.622	1	**.003	.263
Constant	.892	.155	33.321	1	.000	2.441
			Ethnicity			
			Black/non-Hispanic			White/non-Hispanic
n			36			164
Completing			16			119
Not completing			20			45
Completion %			44.44%			72.56%
	B	S.E.	Wald	df	Sig.	Exp(B)
Black, non-Hispanic	−1.173	.372	9.920	1	[b].002	.309
Constant	.950	.162	34.467	1	.000	2.585
White, non-Hispanic	.741	.308	5.779	1	[a].016	2.098
Constant	.223	.254	.775	1	.379	1.250
			Gender			
			Female			male
n			177			49
Completing			128			25
Not completing			49			24
Completion %			72.32%			51.02%
	B	S.E.	Wald	df	Sig.	Exp(B)
Female	.919	.331	7.692	1	[a].006	2.508
Male	.041	.286	.020	1	.886	1.042

[a] Denotes a significant predictive relationship between variable and completion ($p < 0.05$).
[b] Denotes a significant predictive relationship between variable and non-completion ($p < 0.05$).

Participants earning a first program term GPA between 2.50 and 2.99, 3.0 and 3.49, and greater than 3.50 (4.0 scale) were more likely to complete than participants earning other ranges of GPAs. Participants earning GPAs between 2.50 and 2.99 were 4.034 times more likely to complete; participants earning GPAs between 3.0 and 3.49 were 3.244 times more likely to complete, and participants earning GPAs above 3.5 were 3.181 times more likely to complete. Conversely, participants earning a first program term GPA less than 1.0 were 3.964 times less likely to complete. No significant relationship between a first program term GPA between 1.0 and 1.99 or between 2.0 and 2.49 and degree completion was established.

Participants earning a cumulative GPA at the end of the first program term between 3.0 and 3.49 were 1.878 times more likely to complete than participants earning other cumulative GPA ranges, while participants earning a cumulative GPA between 2.0 and 2.49 were 1.178 times less likely to complete. No significant relationship between earning a cumulative GPA at the end of the first program term less than 2.0, between 2.5 and 2.99, or greater than 3.5 and degree completion was established.

Participants failing a program course, after completing the first program course successfully, were 2.642 times less likely to complete than participants not failing an additional program course.

Table 4
Statistically significant environmental variables.

						Campus "X"
n						25
Completing						10
Not completing						15
Completion %						40%
	B	S.E.	Wald	df	Sig.	Exp(B)
Campus "X"	**−1.308**	.437	8.960	1	[b]**.003**	.270
Constant	.902	.156	33.602	1	.000	2.466
		Professional advisor				Faculty advisor
n		87				139
Completing		68				85
Not completing		19				54
Completion %		78.16%				61.15%
	B	S.E.	Wald	df	Sig.	Exp(B)
Professional advisor	.821	.312	6.911	1	[a]**.009**	**2.274**
Faculty advisor	.454	.174	6.796	1	.009	1.574

[a] Denotes a significant predictive relationship between variable and completion ($p < 0.05$).
[b] Denotes a significant predictive relationship between variable and non-completion ($p < 0.05$).

3.3. Personal factors

BLR equations demonstrated significant predictive relationships between specific personal factors and degree completion: age, ethnicity, and gender (Table 3). There was no significant predictive relationship established between Veterans Administration (VA) benefit-eligibility status, or U. S. citizenship and degree completion.

Participants between 25 and 29 years old at program admission were 2.35 times more likely to complete than participants of other age ranges, but participants between 40 and 44 years old at program admission were 1.334 times less likely to complete. No significant relationship between the following age ranges at program admission and degree completion was established: 18 to 19, 20 to 21, 22 to 24, 30 to 34, 35 to 39, or over 44 years old. White, non-Hispanic participants were 2.098 times more likely to complete than participants identifying as other ethnicities, but Black, non-Hispanic participants were 1.173 times less likely to complete than participants identifying as other ethnicities. No significant relationship was established for participants identifying as Asian/Pacific Islander, Hispanic, or multi ethnicity and degree completion. Female participants were 2.508 times more likely to complete than male participants.

3.4. Environmental factors

BLR equations demonstrated significant predictive relationships between specific environmental factors and degree completion: campus of attendance and advising model (Table 4). Participants enrolled at one specific campus were 1.308 times less likely to complete than were participants enrolled at other campuses. Participants advised by a professional advisor, rather than by a full-time faculty member, were 2.274 times more likely to complete. There was no significant predictive relationship established between whether the first program course was taught by a full-time or part-time faculty member or between program cohort membership and degree completion.

4. Discussion

4.1. Overview

The significance of the results is in providing additional clarity to the literature and in suggesting specific factors influencing student success in associate degree respiratory therapy programs. The results appear to confirm the influence of specific factors on student success: academic performance (behavioral), ethnicity (personal), and effective advising (environmental).

4.2. Practical implications

Recognizing that certain behavioral factors, personal factors, and environmental factors appear to predict the likelihood of degree completion, campus leaders may be better-equipped to develop needed student and program supports, possibly improving the likelihood of student success. Additionally, associate degree respiratory therapy program leaders may be better-equipped to develop effective student recruitment and selection policies, may be able to promote student engagement activities inside and outside the classroom, and may be better-equipped to support promoting effective instructor (as leader)/student (as follower) relationships, each, possibly improving degree completion. Utilizing tenets of Hersey and Blanchard's *Situational Leadership Model*, suggesting management-and by extension, classroom pedagogy-is situational, related to combinations of employees' (and students') abilities and motivations, instructors may become better able to assess and to understand students' learning styles and to develop effective pedagogies that may promote increased degree completion.[34]

4.3. Applications

Specific behavioral factors appearing to predict degree completion—grade in first program course, first program term and end of first term cumulative GPA, and failing a required program course—each reflect components of academic performance. However, caution should be exercised before developing student and program supports, as academic enrichment programs, including tutoring, may not be sufficient to enable students to earn higher grades. Academic performance may be influenced by other unidentified factors, including high school academic rigor, self-perception of academic abilities, and available course scheduling. The same caution should be exercised when attempting to develop supports for students of specific age groups (40−44 years old) and ethnicities (black), as suggested by the study results, as these students' non-completion may be influenced by other non-identified factors, including family and work obligations, and reluctance to access available supports.

In recent years, top leadership and organizational structure at Campus "X" have changed twice, and there has been recent turnover of the two full-time faculty positions (program director and director of clinical education). However, student non-completion at this campus could have been influenced by other unidentified factors, such as access to necessary equipment or clinical facilities.

An advising model utilizing a professional advisor, rather than utilizing a faculty advisor, appears to promote degree completion over two-fold, likely by increasing student access to someone with a role dedicated exclusively to promoting student success. By providing needed student and program supports and by developing instructor/student relationships promoting degree completion, leaders may be able to respond more effectively to increasing calls to improve current low levels of student retention, specifically in associate degree respiratory therapy education programs.[1−3]

4.4. Limitations

Although the study results suggest certain factors influence student success in associate degree respiratory therapy programs, additional work is necessary before developing needed student and program supports and before attempting to develop instructor/student relationships supporting degree completion. Although specific behavioral, personal, and environmental factors appear to predict completion, and certain others appear to predict non-completion, limitations of the current study results are a lack of ability to identify why these factors are significant predictors and what relationships may exist between the factors. In addition, the sub-samples of four variables appearing to predict non-completion (grade of F in first program course, failing a required program course after first course, age 40−44 at program admission, and attending Campus "X") are relatively small, perhaps impacting the generalizability of these results and suggesting the variables predict completion more accurately than non-completion. Additional limitations may include a lack of generalizability beyond programs in respiratory therapy and beyond the program examined.

4.5. Recommendations for future research

Future research could consider the following topics: replicating the current study utilizing participants from a different respiratory therapy program, conducting a longitudinal examination utilizing additional cohorts, utilizing the current data to identify and to examine any relationships existing between factors significant for predicting completion or non-completion, and assessing participants' perceived factors promoting completion and non-completion. Replicating the current study utilizing participants from a different

respiratory therapy program may increase the generalizability of the current study results. Conducting a longitudinal examination utilizing additional cohorts may provide additional insights into the overall effectiveness of a complete curriculum cycle in promoting student success. Utilizing the current data to identify and to examine any relationships existing between factors significant for predicting completion or non-completion may provide additional insights and may increase generalizability; however caution should be exercised not to reduce the overall base model's predictive ability. Assessing participants' perceived factors promoting completion and non-completion and examining any relationship between the perceived factors and the factors statistically significant for appearing to predict completion and non-completion, utilizing a mixed-methods design may provide information valuable in developing needed student and program supports.

4.6. Conclusions

Triadic reciprocal causation (TRC) theory suggests human functioning results from the reciprocal interplay of behavioral, personal, and environmental factors,[5] and utilizing the implications suggested by the results, campus leaders—specifically leaders of associate degree respiratory therapy programs—may be able to promote student success. Promoting student success, utilizing the implications from the results, may enable leaders to respond to specific challenges related to retention and completion.[1−3]

Disclosure

Ethical approval

Ethical approval was granted by the Research Ethics Committee(REC) of Spalding University, April 1, 2019, following the Expedited Review Procedures as outlined by 46.110 of the regulatory guidelines of Health and Human Services Codes of Federal Regulations pertaining to the protection of human subjects (Title 45, Part 46).

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Other disclosures

None.

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