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Passing the NBCOT Examination: Preadmission, Academic, and Fieldwork Factors

Abstract

All occupational therapy students are required to successfully complete the certification examination administered by the National Board for Certification in Occupational Therapy (NBCOT) before they can practice independently. The need to repeat the examination can result in stress, anxiety, and financial hardship. This paper explores the relationship of preadmission factors, academic and fieldwork performance, and demographic variables to successful first-time attempts on the certification examination for occupational therapists. Data were gathered from 144 student files in a Master of Occupational Therapy (MOT) Program at a single university. Of the sample, 82% passed and 18% failed their first NBCOT test trial. Considered independently, preadmission recommendation letters and writing sample scores, graduate MOT program GPA, lack of MOT program difficulty, fieldwork self-reports, and gender predicted NBCOT certification examination outcomes. When considered together in logistic regression models predicting outcome, this combination of factors correctly predicted 86.2% of student outcomes (or 20% to 32% of the variance in certification examination success), with OT program GPA and preadmission recommendation scores predicting unique outcome variance. This information may be helpful to admissions committees as well as to occupational therapy faculty as they identify strategies and practices to facilitate first-time test taking success on the NBCOT certification examination.

Keywords

certification examinations, predictors, student outcomes

Cover Page Footnote

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Credentials Display and Country

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All entry-level occupational therapy (OT) practitioners are required to successfully complete the certification examination administered by the National Board for Certification in Occupational Therapy (NBCOT). The certification examination is designed with the intent to protect the public interest by ensuring that the examinee has the knowledge necessary to practice OT safely. It is a precursor to obtaining a license to practice in each of the 50 states, the District of Columbia, Guam, and Puerto Rico (National Board for Certification in Occupational Therapy [NBCOT], 2016).

Students frequently report that they experience stress and anxiety as they anticipate the implications of passing or of not passing the certification examination. In addition to this emotional toll, there are financial costs associated with having to repeat the examination in the event of a failure, and many students typically have already incurred considerable education-related debt.

How students perform on the NBCOT certification examination also has implications for their academic institutions. The Accreditation Council for Occupational Therapy Education (ACOTE), the standard-setting agency for OT education, has determined that “The average pass rate over the 3 most recent calendar years for graduates attempting the national certification exam within 12 months of graduation from the program must be 80% or higher (regardless of the number of attempts)” (Accreditation Council for Occupational Therapy Education [ACOTE], 2011, p. 16). In addition to being an important accreditation standard, a program’s NBCOT certification

examination pass rate is one of the many factors potential program applicants consider and, in some cases, the pass rate reflects the program’s academic reputation.

Since an individual’s ability to practice OT hinges on the successful completion of the certification examination, his or her performance on the examination is a high-stakes endeavor, for the student and for the academic institution. The purpose of this study was to identify the association among student-related factors, including preadmission variables, OT academic and fieldwork performance ratings, and demographic characteristics, and first-time pass rates for the NBCOT certification examination for a group of Master of Occupational Therapy (MOT) students.

Literature Review

Admissions committees commonly use a student’s overall undergraduate grade point average (GPA) and prerequisite course GPA as screening tools to determine whether he or she will be accepted into an OT academic program (Salvatori, 2001). Standardized aptitude tests, interviews, writing samples, and letters of recommendation are also frequently considered by OT program admissions committees when making the decision. The relative weight or degree of importance that the committees attribute to each criterion is, however, variable and unique to individual institutions. While ACOTE provides clear standards for multiple components of the OT curriculum, the commission defers to the unique admission practices of the academic institution (ACOTE, 2011).

There is an abundance of literature related to academic selection criteria and their relationship to

future academic performance. A meta-analysis by Kuncel, Hezlett, and Ones (2001) determined that undergraduate GPA and performance on the Graduate Record Examination (GRE) are generally valid predictors of future academic performance in graduate school. This finding that past academic performance predicts future academic performance has been replicated in studies focused exclusively on OT graduate students (Kirchner & Holm, 1997; Kirchner, Stone, & Holm, 2000; Lysaght, Donnelly, & Villeneuve, 2009) as well as in studies on students in other related health care professions (Halberstam & Redstone, 2005; Jones, Simpkins, & Hocking, 2014; Keskula, Sammarone, & Perrin, 1995; Utzman, Riddle, & Jewell, 2007a). In addition, Bathje, Ozelie, and Deavila (2014) and Kirchner et al. (2000) identified correlations between undergraduate GPA and GRE scores and future performance on fieldwork and academic performance at the graduate level among OT students.

Although evidence supports that undergraduate academic performance and scholastic aptitude are associated with (and in some cases predictive of) OT students' academic and fieldwork performance, there is no published evidence that explores the relationship between these preadmission factors and performance on the NBCOT certification examination. In contrast, research in related fields has identified relationships between such preadmission factors as undergraduate GPA, prerequisite course GPA, and/or Scholastic Aptitude Test (SAT)/GRE performance with subsequent performance on the

(Dockter, 2001; Galleher, Rundquist, Barker, & Chang, 2012; Hollman et al., 2008; Thieman, Weddle, & Moore, 2003; Utzman, Riddle, & Jewell, 2007b) and the Physician Assistant National Certifying Examination (PANCE) (Andreeff, 2014; Ennulat, Garrubba, & DeLong, 2011; Higgins et al., 2010).

Authors across health care disciplines have raised questions regarding the value of admission interviews as a student selection tool (Agho, Mosley, & Smith-Paul, 1998; Ehrenfeld & Tabak, 2000; Goho & Blackman, 2006; Morris, 1999; Posthuma & Noh, 1990; Vargo, Madill, & Davidson, 1986). In-person interviews are labor-intensive, represent a costly expenditure for both the institutions and the applicants, and have been criticized as being largely subjective in nature. Yet many argue that in-person interviews provide important data regarding interpersonal or noncognitive variables that are not addressed by other admission selection strategies. Empirical data on the predictive use of interview data have been mixed. Balogun (1988); Vargo Madill, and Davidson (1986); and Posthuma and Noh (1990) reported that the interview had minimal predictive ability regarding OT students' academic performance and performance during fieldwork. In contrast, Hollman et al. (2008) reported that performance in behavioral interviews was shown to predict performance on the NPTE in 89 subjects from one university. Despite the controversy related to in-person interviews, they continue to represent a key selection tool for admission into many academic OT programs (Dietrich & Crowley, 1982; Goho & Blackman, 2006; Morris, 1999; Scott

et al., 1995). Yet, to date, no studies have evaluated whether OT program admission interviews predict performance on the NBCOT certification examination.

Writing samples also represent a commonly used selection measure in a variety of health care programs (Dietrich & Crowley, 1982; Johnson, Arbes, & Thompson, 1974; Scott et al., 1995). While limited, the evidence suggests that writing samples can predict the future academic success of students in speech-language pathology and OT graduate programs (Halberstam & Redstone, 2005; Kirchner & Holm, 1997; Schmalz, Rahr, & Allen, 1990). However, in an attempted replication of Kirchner and Holm's (1997) findings, Kirchner et al. (2000) found no correlation between written essay scores and academic or fieldwork performance in a study of MOT students. Furthermore, no previous research has attempted to link preadmission writing performance with future performance on the NBCOT certification examination.

Strong letters of recommendation have long been a standard criterion for admission to graduate-level training programs (Appleby & Appleby, 2006). Yet, questions remain as to the value and predictive use of data obtained from letters of recommendation, despite their widespread use (Salvatori, 2001; Scott et al., 1995). Individuals who agree to write a letter of recommendation on behalf of an applicant typically provide information that presents the candidate in a positive light. Given the fact that letter writers cannot be assured that the information they provide will be held in confidence, there is also the potential that recommendation

ratings may not represent an accurate assessment of the applicant (Hulse, 1989). Thus, it is reasonable to question both the objectivity and value of this measure. Few studies have directly examined the predictive use of data obtained from letters of recommendation. Kirchner and Holm (1997) reported no predictive value of letters of recommendation on future academic performance or fieldwork in their study of MOT students. In contrast, Halberstam and Redstone (2005) reported that letters of recommendation were predictive of GPA in students in a speech-language pathology graduate program. To date, no studies have examined the predictive value of ratings obtained from letters of recommendation to performance on the NBCOT certification examination.

While acknowledging differences in the intent, design, methodology, and size of extant studies, researchers suggest that both GPA and academic difficulties experienced while in graduate school are associated with performance on certification examinations across a variety of health care fields. For example, graduate program GPA has been shown to predict performance on certification examinations in physical therapy, physician assistant, and athletic trainer programs (Andreeff, 2014; Dockter, 2001; Kosmahl, 2005; Luedtke-Hoffmann, Dillon, Utsey, & Tomaka, 2012; Middlemas, Manning, Gazzillo, & Young, 2001; Oakes, MacLaren, Gorie, & Finstuen, 1999; Thieman et al., 2003). Harrelson, Gallaspy, Knight, and Leaver-Dunn (1997) reported that although no single variable predicted success on the athletic trainer examination, a composite set of variables that included (among others) overall academic

GPA, athletic training GPA, and academic minor GPA explained 42% of the variance in first attempt examination pass rates. Pitt, Powis, Levett-Jones, and Hunter (2012) similarly noted that “one of the strongest within program indicators for predicting NCLEX-RN (National Council Licensure Examination–Registered Nurse) success was students’ performance in nursing courses throughout a program” (p. 908). These authors also identified three readiness examinations that were reported to predict NCLEX-RN success. In direct contrast, academic difficulties experienced in graduate program work, typically defined as “failing a course or unit or being placed on academic suspension or probation” during the training program, have been shown to predict NPTE failure for physical therapy students (Riddle, Utzman, Jewell, Pearson, & Kong, 2009, p. 1184). For example, Riddle, Utzman, Jewell, Pearson, and Kong (2009) determined that after accounting for all other variables, the odds of failing the NPTE were 5.89 times higher for students who experienced academic difficulty.

At the time of this publication, no published studies had explored the relationship between OT student performance during fieldwork and performance on the NBCOT certification examination. Moreover, the literature that explores the relationship between in-program fieldwork performance and certification examination outcomes in other disciplines is limited. Two studies (Middlemas et al., 2001; Turocy, Comfort, Perrin, & Gieck, 2000) examined the relationship between the number of hours in which athletic

and their performance on the certification examination. Neither study identified predictive value. Kosmahl (2005) determined that there was an insignificant correlation between physical therapy students’ scores on the Clinical Performance Tool (published by the American Physical Therapy Association and used to rate performance during the clinical education experience) and their performance on the NPTE. Luedtke-Hoffmann, Dillon, Utsey, and Tomaka (2012) reported no significant relationship between the Physical Therapist Manual for the Assessment of Clinical Skills and overall student performance on the NPTE; they did, however, identify limited relationships between some portions of the assessment tool and corresponding sections of the NPTE.

There is scant research to support clear and consistent relationships between student demographic variables and certification examination outcomes. There is variable evidence linking age to academic performance in the fields of physical therapy (Dockter, 2001; Utzman et al., 2007a) and nursing (Pitt et al., 2012). Utzman et al. (2007b) reported that failure on the NPTE examination varied with race or ethnicity, yet postulated that the increased tendency for students in some ethnic groups to fail the examination was associated with such factors as socioeconomic status or educational background. Kosmahl (2005) examined the relationship of age at the time of graduation from a physical therapy program to success on the NPTE examination and found no connection. In contrast, Oakes et al. (1999) identified age as a negative predictor of success on

the PANCE and determined gender as a predictor of success (with males being more successful than females).

Although strong graduate-level academic performance is consistently associated with future success on certification examinations, the predictive value of other criteria is variable. The intent of the current study was to explore the relationship among (a) preadmission factors, (b) graduate program performance factors (including academic and fieldwork performance), and (c) demographic factors on first-time pass rates on the NBCOT certification examination for occupational therapists.

Method

This study used a retrospective exploratory analysis design. The university's Institutional Review Board determined this study to be exempt because of the type of data and analysis used. A de-identified database was constructed using information extracted from the files of 144 MOT program students graduating between 2011 and 2014 from a single university. To maintain student anonymity and confidentiality, each student file was assigned a code prior to data extraction. Data were extracted by a faculty member and subsequently verified by a second faculty member for accuracy. Graduate student assistants were involved in side-by-side entry and coding of de-identified information with the faculty members. The data were entered into the Statistical Package for the Social Sciences (SPSS) for analysis.

Sample Characteristics

Table 1 provides a categorical listing of all variables entered into the database. Demographics

included age (at time of program admission), gender, marital status, and ethnicity. Preadmission factors included cumulative undergraduate GPA; scores related to letters of recommendation (total score, potential score, and recommend score); rubric-based interview score components related to insight/knowledge, verbal communication skills, non-verbal communication skills, and poise; and rubric-based writing sample scores related to critical thinking skills, clarity of expression, and use of standard written English. Program performance factors included MOT program GPA; average scores for Level II fieldwork performance as rated by the fieldwork educator; self-evaluation score on the Level II fieldwork evaluation tool; and presence of a modified program related to academic and/or fieldwork performance problems. Details related to measures of preadmission and program performance factors are presented below.

Preadmission Factors

To be considered for admission to the MOT program under study, applicants were typically required to have a cumulative undergraduate GPA of 3.0 or higher on a 4.0 scale. This requirement was also applied to prerequisite course performance in human anatomy with lab, physiology with lab, abnormal psychology, lifespan development, and statistics or research methods.

Applicants were also required to secure three letters of recommendation from academic, volunteer/work, and OT practitioner sources. Recommendation forms asked recommenders to rate the applicant's potential as a graduate student in academic performance, motivation, intellectual maturity, research/writing ability, and community

service on a 5-point Likert scale ranging from 1 (*below average*) to 5 (*exceptional*), and to provide a recommendation for graduate study score ranging from 1 (*do not recommend*) to 5 (*recommend enthusiastically*). The potential and recommendation scores were averaged across all three recommendation letters. These average scores were also summed to create a total recommendation score for each applicant.

Applicant interviews were conducted by a team comprised of a current MOT faculty member and an alumnus of the MOT program. New members of the interview team, whether faculty or alumni, were initially partnered with an experienced faculty member for training purposes and to ensure consistency in ratings between the interview team members.

Each applicant was provided with standardized prompts, including questions related to the interviewee's knowledge and insight into the field of OT and job demands, motivations for wanting to pursue a career in OT, experience with and observation of OT, understanding of the role of OT, awareness of personal strengths and areas for improvement as they relate to being an occupational therapist, and the interviewee's familiarity with the university MOT program. Both interviewers rated the interviewee's responses using a standardized rubric for rating the applicant's insight/knowledge, verbal communication skills, non-verbal communication skills, and poise. The 3-point scaled rubric was customized to the type of prompt provided, with 3 being representative of the highest possible score for each of the individual prompts. A

high level of insight and knowledge related to the content area; who presented as extremely articulate with appropriate eye contact and body language throughout the interview; and who appeared calm, comfortable, well-prepared, and confident. A lower rating was indicative of an applicant who was not able to respond fully to the question, even with cues or additional prompts, and who displayed distracting verbal and/or non-verbal behaviors.

Following the interview, the paired interview team members reviewed the basis of their ratings, resolving discrepancies until achieving consensus. Interview scores were calculated based on the percentage of potential total points achieved for each category and for the total interview score.

All interviewees also participated in an on-site, timed writing sample task. The interviewees were allotted 30 min to complete a writing exercise that included identification of a flawed research design and strategies for improvement of the design. The faculty member who conducted the interviews scored the applicants' written responses on a 4-point Likert scale for evidence of critical thinking skills, clarity of expression, and use of standard written English (grammar, punctuation, and spelling). The faculty member used a standardized rubric that provided quantifiable guidelines for scoring. The total writing sample scores were developed by combining the three writing subscales scores. Questionable writing samples were reviewed by a second faculty member to achieve scoring consensus.

Academic Program Performance Factors

Program GPA was the cumulative GPA (based on a 4.0 scale) that a student had achieved

while in the MOT program and was based solely on the required courses associated with the MOT program.

The *Fieldwork Performance Evaluation for the Occupational Therapy Student* (FWPEOTS) is an evaluation tool available for purchase from the American Occupational Therapy Association (AOTA) (American Occupational Therapy Association [AOTA], 2002). The tool is designed to measure competency in skills deemed necessary for entry-level OT practice and is used to evaluate student performance during the Level II fieldwork experiences. The tool addresses 42 items that are scored on a scale from 1 (*unsatisfactory*) to 4 (*exceeds standards*). The minimum passing score as determined by AOTA is 122 out of a possible 168. There are two variables in the database related to the FWPEOTS. The first variable (FW self-evaluation) reflects the student's self-assessment on the FWPEOTS prior to the initiation of the Level II fieldwork experiences. The second FWPEOTS variable (FW educator) is comprised of the average of the final scores reported by the fieldwork educators at the completion of the Level II fieldwork experiences. See the AOTA website (www.aota.org) for additional information about the FWPEOTS tool.

Two variables, —academic modified program and fieldwork modified program, — indicated if the student required a modification to his or her academic or fieldwork program. Modifications were made if the student failed to pass a course and/or a fieldwork assignment. These variables were numerically coded in SPSS to indicate yes or no.

The primary outcome measure (passing or failing the NBCOT certification examination on the first attempt) was acquired from the official report provided to the MOT program director by NBCOT. The minimum passing score, as determined by NBCOT, was 450 points out of a possible 600 points. See the NBCOT website (www.nbcot.org) for additional information about reliability, validity, and examination content.

Data Analysis

Of the 144 MOT students in the current sample, 118 (81.94%) passed and 26 (18.06%) failed the NBCOT certification examination on their first attempt. Independent sample t-tests and chi-square tests (with Fisher's Exact Tests used to verify chi-square tests with small cell sizes) were first run to evaluate differences between the groups of students who passed versus those who failed the certification examination across individual demographic, preadmission, and program performance factors. Demographic variables, preadmission factors, and program performance factors observed to be potentially significant in univariate analyses (defined as $p < .10$) were subsequently included in logistic regression models developed to predict pass/fail outcomes based on a combination of (a) all pertinent factors and (b) demographic and preadmission factors only.

Table 1*Sample Characteristics and Variable Ranges for Full Sample (N = 144)*

Demographics	Mean (SD)	Range
Age	26.55 (4.20)	23-60 years
	n (%)	
Gender (% male)	12 (8.33%)	
% Married	17 (11.81%)	
Ethnicity	n (%)	
White	139 (96.53%)	
African-American	3 (2.08%)	
Asian-American	2 (1.39%)	
Preadmission Factors	Mean (SD)	Range
Undergraduate GPA	3.42 (.26)	2.65 - 3.99
Letters of Recommendation – Total	9.18 (.55)	7.11 - 10.00
Recommend score	4.71 (.35)	3.66 - 5.00
Potential score	4.47 (.30)	3.45 - 5.00
Interview – Total %	.89 (.08)	.65 - 1.00
Insight/knowledge	.87 (.09)	.60 - 1.00
Verbal communication	.88 (.16)	.67 - 1.00
Nonverbal communication	.97 (.10)	.67 - 1.00
Poise	.93 (.14)	.67 - 1.00
Writing Sample - Total	10.19 (1.21)	7 - 12
Critical thinking	3.39 (.71)	1 - 4
Clarity of expression	3.09 (.63)	1 - 4
Standard written English	3.71 (.54)	1 - 4
Program Performance	Mean (SD)	
MOT program GPA	3.88 (.13)	3.39 - 4.0
FW educator evaluation	139.37 (8.91)	123.00 - 162.50
FW self-evaluation	105.39 (14.23)	68 - 147
	n (%)	
Academic modification program	6 (4.17%)	
Fieldwork modification program	5 (3.47%)	

Note. GPA = grade point average; MOT = Master of Occupational Therapy; FW = fieldwork.

Table 2*Univariate Tests Comparing Students who Failed versus Students who Passed the NBCOT Exam*

	NBCOT Fail (N = 26)	NBCOT Pass (N = 118)	Test Statistic		
Demographics	Mean (SD)	Mean (SD)	t (df)	n	p
Age	28.04 (7.85)	26.22 (2.78)	1.16 (26.39)	144	.25
	n (%)	n (%)	X² (df)	n	p
Gender (% male)	5 (19.23%)	7 (5.93%)	4.93 (1)	144	.03
% Married	3 (11.53%)	14 (11.86%)	.00 (1)	144	.96
	n (%)	n (%)	X² (df)	n	p
Ethnicity			.92 (2)	144	.63
White	25 (96.15%)	115 (97.45%)			

African-American	1 (3.85%)	2 (1.69%)			
Asian-American	0 (0%)	2 (1.69%)			
Preadmission Factors	Mean (SD)	Mean (SD)	t (df)	n	p
Undergraduate GPA	3.38 (.23)	3.43 (.27)	-.96 (142)	144	.34
Letters of Recommendation – Total	8.99 (.63)	9.22 (.52)	-2.0 (138)	140	< .05
Recommend score	4.55 (.45)	4.75 (.32)	-2.15(30.80)	140	.04
Potential score	4.44 (.39)	4.48 (.28)	-.42 (31.28)	140	.68
Interview – Total %	.89 (.07)	.89 (.08)	.14 (142)	144	.88
Insight/knowledge	.87 (.08)	.87 (.09)	-.02 (142)	144	.99
Verbal communication	.87 (.16)	.88 (.16)	-.36 (142)	144	.72
Nonverbal communication	.97 (.09)	.97 (.10)	.38 (142)	144	.70
Poise	.95 (.12)	.92 (.14)	.84 (142)	144	.40
Writing Sample - Total	9.76 (1.48)	10.28 (1.14)	-1.97 (140)	142	.05
Critical thinking	3.32 (.80)	3.40 (.70)	-.52 (140)	142	.61
Clarity of expression	2.92 (.76)	3.13 (.60)	-1.51 (140)	142	.13
Standard written English	3.52 (.82)	3.75 (.45)	-1.37(27.19)	142	.18
Program Performance	Mean (SD)	Mean (SD)	t (df)	n	p
MOT program GPA	3.79 (.16)	3.90 (.12)	-3.15(30.90)	144	< .01
FW educator evaluation	138.38 (9.64)	139.59 (8.77)	-.62 (142)	144	.53
FW self-evaluation	110.19 (15.87)	104.33 (13.68)	1.92 (142)	144	.06
	n (%)	n (%)	X² (df)	n	p
Academic Mod program	6 (23.08%)	0 (0%)	28.65 (1)	144	< .01
Fieldwork Mod program	2 (7.69%)	3 (2.54%)	1.71 (1)	144	.19

Note. GPA = grade point average; MOT = Master of Occupational Therapy; FW = fieldwork; mod = modification; findings from X^2 tests with small cell sizes were confirmed with Fisher's Exact Tests.

Results

Full Sample Description

The full study sample ($N = 144$) was comprised of all students graduating between 2011 and 2014 from a single university MOT program. Means, standard deviations, and variable ranges for the full sample are provided in Table 1. The mean age of the sample was 26.55 ($SD = 4.20$) years. The majority of the sample was female (91.67%) and single (88.19%). A majority of the sample self-identified as White (96.53%; with 2.08% identifying as African-American and 1.39% identifying as Asian-American). The mean undergraduate GPA was 3.42 ($SD = .26$), and the mean MOT program GPA was 3.88 ($SD = .13$). Average scores from letters of recommendation were 4.71 ($SD = .35$) for strength of

recommendation for graduate study (reflective of a rating between *recommend enthusiastically* and *recommend confidently*) and 4.47 ($SD = .30$) on potential success in the MOT program (reflective of a rating between *exceptional* and *excellent*). Mean percentile scores for interview subscales ranged from .87 (insight score) to .97 (nonverbal score), with an average total interview percentile score of .89 ($SD = .08$). Mean writing sample subscale scores ranged from 3.09 (clarity) to 3.71 (use of standard written English), with an average cumulative writing score of 10.19 ($SD = 1.21$). The average score of the two Level II fieldwork experience evaluations from the fieldwork educators ($M = 139.37$, $SD = 8.91$) were generally higher than the student self-evaluations of fieldwork performance ($M = 105.39$, $SD = 14.23$). Only six of

the students (4.17%) were placed on modified academic programs, and five of the students (3.47%) were placed on modified fieldwork programs.

Results of Univariate Analyses

Results of univariate analyses comparing students who passed versus students who failed on the first attempt of the NBCOT certification examination are summarized in Table 2. The students who failed did not significantly differ from the students who passed in terms of age, marital status, or ethnicity. However, the males were found to be more likely to fail on their first certification examination attempt (41.67% fail rate), as compared with the females (15.91% fail rate). In terms of preadmission factors, no differences were obtained between the students who failed versus those who passed in terms of undergraduate GPA or on any of the in-person interview scores. However, the students who failed the certification examination on their first attempt had lower mean recommendation strength scores on letters of recommendation (4.55 vs. 4.75 for those who passed, $p = .04$), and lower total writing sample scores (9.76 vs. 10.28 for those who passed, $p = .05$). Finally, the students who failed the certification examination were found to have lower MOT program GPAs ($M = 3.79$, $SD = .16$), as compared to the students who passed ($M = 3.90$, $SD = .12$; $p < .01$). The students who failed were more likely to have been placed on a modified academic program (23% of those who failed vs. 0% of those who passed, $p < .01$). While the students who failed

did not significantly differ in the average final fieldwork scores provided by fieldwork educators, they did trend toward providing higher self-evaluations on the FWPEOTS ($M = 110.19$, $SD = 15.87$), as compared with self-evaluations provided by the students who passed ($M = 104.33$, $SD = 13.68$), $p = .06$.

Results of Logistic Regression Models

An initial logistic regression model was conducted to predict first-time test taker outcomes on the NBCOT certification examination from all available variables observed to be potentially significant (defined p 's $< .10$) in univariate analyses. This initial logistic regression model included gender, recommendation strength scores, total writing sample scores, MOT program GPA, fieldwork self-evaluation, and if the student was placed on a modified academic program. When all six variables were considered together, they significantly predicted the NBCOT outcomes: $\chi^2 = 30.07$, $df = 6$, $N = 138$, $p < .01$. Cox and Snell (1989) and Nagelkerke (1991) R^2 estimates suggest that approximately 20% to 32% of the variance in the NBCOT outcomes could be predicted by this combination of variables. Overall, 86.2% of the student outcomes were correctly predicted by this model, with 99.1% of the students who passed and 28% of the students who failed correctly identified.

Follow-up analyses exploring this full logistic regression model suggested, however, that issues of multicollinearity existed between three of the six predictor variables: total writing sample scores, MOT program GPA, and if the student was placed on a modified academic program. Of note,

total writing sample scores obtained at the initial interview were significantly associated with later MOT program GPA: $r = .38, p < .01$. The six students placed on modified academic programs had lower MOT program GPAs ($M = 3.58, SD = .13$), as compared with the students not placed on modified programs ($M = 3.89, SD = .12$), $t(142) = 6.26, p < .01$. Thus, to evaluate the relative strength of individual predictor variables in a model unencumbered by multicollinearity issues, the above logistic regression was repeated including only four of the original predictor variables. Given the potency and general applicability of MOT program GPA scores, we elected to include this variable (and to remove the writing sample and academic modification variables) in this follow-up logistic regression model predicting certification examination outcomes from a combination of gender, recommendation strength scores, MOT program GPA, and fieldwork self-evaluation. When these four variables were considered together, they significantly predicted the NBCOT certification examination outcomes: $\chi^2 = 19.56, df = 4, N = 140, p < .01$. Cox and Snell (1989) and Nagelkerke (1991) R^2 estimates suggest that approximately 13% to 21% of the variance in examination outcomes could be predicted by the combination of these four variables. Overall, 82.9% of the student outcomes were correctly predicted by this model, with 98.2% of the students who passed and 15.4% of the students who failed correctly identified. Table 3 presents the odds ratios for individual factors in the model, which suggests that the odds of passing the certification examination on

the first attempt are significantly increased for students with higher program GPAs and stronger initial recommendation scores (see Table 3).

To test a logistic regression model for utility to predict outcomes on the certification examination prior to engagement in graduate OT studies, a second logistic regression that included only significant demographic and preadmission factors was tested. This logistic regression model included gender, recommendation strength scores, and total writing sample scores. When all three of these factors were considered, they significantly predicted certification examination outcomes: $\chi^2 = 11.73, df = 3, N = 138, p < .01$. Cox and Snell (1989) and Nagelkerke (1991) R^2 estimates suggest that approximately 8% to 13% of the variance in examination outcomes could be predicted by the combination of these demographic and preadmission variables. Overall, 82.6% of the student outcomes were correctly predicted by this model, with 98.2% of the students who passed and 12% of the students who failed correctly identified. Table 4 presents the odds ratios for individual factors in this model, which suggests that the odds of passing the NBCOT certification examination on the first attempt are significantly increased among students with higher initial recommendation scores: ($p < .01$) (see Table 4).

Table 3

Logistic Regression Results Predicting the NBCOT Exam Outcomes

Variable	B	SE	Odds Ratio	p
Gender	-1.09	.70	.34	.12
Recommendation Score	1.23	.61	3.41	.04
MOT Program GPA	4.50	1.66	90.23	.01
Fieldwork Self-Evaluation	-.01	.02	.98	.36

Table 4

Logistic Regression Results Predicting the NBCOT Exam Outcomes Using Only Significant Demographic and Preadmission Factors

Variable	B	SE	Odds Ratio	p
Gender	-1.27	.68	.28	.06
Recommendation Score	1.26	.59	3.54	.03
Writing Total	.28	.18	1.32	.13

Discussion

This study examined a range of preadmission, academic and fieldwork performance, and demographic factors associated with first-time pass rates on the NBCOT certification examination. Our results indicate that demographic factors, such as age, marital status, and ethnicity, are not associated with or predictive of first-time pass rates on the certification examination. These findings are supportive of the university mission, which promotes diversity among the student body in the academic setting as contributory to student success. Of note, the preadmission factor undergraduate GPA also was not associated with passing the NBCOT certification examination. We would note, however, that preadmission criteria

related to cumulative undergraduate GPA likely resulted in a restriction of range on this criterion, diminishing its potential predictive power.

Although our results indicate that males may be at a higher risk for first-time NBCOT certification examination failure, these results must be interpreted with caution because of the extremely limited representation of males in the sample and the potential for sampling bias on this factor. Because a disparity in gender is reflected across academic programs (AOTA, 2015), this finding may point to a need for further exploration of gender-related factors that may contribute to performance difficulties on the NBCOT certification examination.

Additional academic characteristics associated with failing the first attempt at the NBCOT certification examination included lower total writing sample scores, lower MOT program GPA, and being on a modified academic program. Although the writing sample score was a preadmission criterion, this score does reflect a student's abilities in critical thinking and written communication. These skills are used throughout the MOT program coursework, which can impact the student's program GPA. Furthermore, the ability to articulate concepts accurately is a critical skill for successful academic and fieldwork performance. A lower writing sample score may be indicative of a student who will experience challenges in the academic program. The need to be placed on a modified academic program and a lower program GPA are clearly related and may be predictive of future academic vulnerability. Thus,

difficulties noted across any of these three academic-based variables may help to identify students who require additional academic counseling and/or tutoring to improve their performance and enhance their ultimate success on the NBCOT certification examination.

Of note, the students with lower recommendation scores on their preadmission letters of recommendation were also more likely to fail on their first NBCOT certification examination attempt. This may suggest the need for scrutiny around this admission criterion and reconsideration of the weight and value of this factor in decision making during the admission process.

It is ironic that the students who did not pass the NBCOT certification examination on their first attempt also trended toward providing higher self-assessment scores on the fieldwork placement performance measure (FWPEOTS), which were not, however, reflected in any differences on the fieldwork educator-rated fieldwork placement scores. While replication of this finding is needed, this result may reflect limited self-awareness or insight of students into their current level of professional competence. As such, there may be a need for faculty to explore curricular opportunities that encourage or enhance self-awareness of one's professional skills and competencies.

The fact that no difference in average fieldwork educator-rated scores were noted between the students who did and did not pass the NBCOT certification examination on the first attempt may also highlight differences in academic versus performance-based skill sets. Indeed, there is

debate as to the degree to which student performance during the fieldwork experience can or should be correlated with performance on certification examinations. Whereas examinations typically require the student to recall, analyze, and apply knowledge to answer paper-based test questions correctly, fieldwork experiences require that the student also demonstrate the ability to execute his or her knowledge and practice skills in real-life situations. The fieldwork experience further requires that the student demonstrate many behaviorally oriented skills that are not addressed on certification examinations. These include, but are not limited to, verbal and non-verbal communication, documentation, the ability to administer assessments and interventions, and myriad professional behaviors.

The results of this study provide a basis for consideration of both the admission process and the program procedures designed to offer curricular support to students exhibiting signs of academic struggles.

Limitations

Limitations exist in this study that may affect the generalizability of the results. The small sample as well as the extraction of this sample from a single university may limit the extent to which results generalize to other samples or other OT programs (that may, for example, have slightly different admission criteria). The lack of diversity in gender and ethnicity may further restrict the applicability of these findings to other samples or settings. The diversity in admission processes as well as the curricular offerings in OT programs

further complicates the ability to compare the factors. Therefore, the methodology used for this study may or may not be applicable to studies in other OT academic settings. Further research will be needed both to replicate and to extend the current findings.

Conclusion

Passing the NBCOT certification examination is a high-stakes endeavor. While passing the examination is the final step in a student's preparation for becoming an occupational therapist, it is the first step in the student's entrance into practicing OT. The purpose of this study was to identify student-related factors associated with passing the NBCOT certification examination on the first attempt among a group of MOT students. Given the significant implications for passing the NBCOT certification examination, it is critical for academic institutions to identify the factors associated with success on examination completion. By enhancing their awareness of the influence of such factors on first-time test takers, institutions may refine their admission processes and redesign their curricula, and faculty may be better prepared to counsel students to enhance their potential for examination success.

This study offers limited preliminary insight into important factors associated with the successful performance of first-time test takers on the NBCOT certification examination. In addition, this study provides investigation of variables that had not yet been fully explored or made available in current literature. These results provide the opportunity for additional inquiry to identify the complexities

associated with individual and combined variables that may influence examination performance.

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