The Relationship Between Candidate Psychological Factors and First-Attempt Pass Rate on the Board of Certification Examination

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Context: Success on the Board of Certification (BOC) examination is necessary to obtain the Certified Athletic Trainer (ATC) credential. First attempt pass rates have historically been an issue in the profession.

Objective: The purpose of this exploratory study was to examine the impact of coping, locus of control, and academic worry on first-attempt passing rates on the Board of Certification (BOC) examination. Study strategies for the BOC examination were also investigated.

Design: Survey-based design.

Setting: Participants were recruited through e-mails sent to Commission on Accreditation of Athletic Training Education– accredited entry-level program directors that were forwarded to recent program graduates, who then accessed the survey instrument via the web link located within the original e-mail.

Patients or Other Participants: The research sample consisted of 145 newly graduated athletic training (AT) students, who challenged the BOC examination between April and October in 2010.

Data Collection and Analysis: The survey instrument included three sections of items used to measure the elements of locus of control, coping methods, and academic worry. Analyses explored the relationships between these factors and first-attempt pass rates on the BOC examination.

Results: Data from this exploratory study suggest that candidates experiencing psychological factors, such as high academic worry, emotion-focused coping mechanisms, and an external locus of control, have a lower first-attempt pass rate on the examination. These candidates also use multiple strategies to prepare for the exam.

Conclusions: The AT programs might be able to help students better prepare for the BOC examination by addressing these psychological issues and using multiple study strategies and structured preparation activities. Further studies are needed to confirm this finding.

Key Words: Athletic trainer, certification, locus of control, coping, academic worry

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INTRODUCTION

Certification of athletic trainers by the National Athletic Trainers' Association began in 1969. Since 1989, the Board of Certification, Inc (BOC) has been the autonomous "nonprofit credentialing agency that provides certification for the athletic training profession."^{1(p3)} The BOC's stated mission is "to provide exceptional credentialing programs for healthcare professionals to assure protection of the public."^{2(p5)} The Certified Athletic Trainer (ATC) credential is the cornerstone for regulation in many states, and the BOC certification exam meets requirements in 47 of the 48 states that regulate athletic trainers.³ In order to obtain entry-level certification, "an individual must graduate from an athletic training education program accredited by the Commission on Accreditation of Athletic Training Education (CAATE) with a Bachelor's or Master's degree and pass the BOC certification exam."^{2(p5)}

Beginning in June 2007, the national certification examination moved from a traditional paper-and-pencil examination to one that was completely computer based. The exam has 175 scored and unscored multiple-choice questions, stand-alone alternative items (including drag-and-drop, text-based simulation, multi-select, hot spot), and focused testlets (consisting of a scenario and 5 key/critical questions related to that scenario).^{1,2} These components assess whether the candidate sufficiently understands the principles, practices, and sciences underlying the practice of athletic training as described in the *Role Delineation Study/Practice Analysis*, 6th edition. The test also measures a candidate's decision-making skills and whether they demonstrate entry-level proficiency in the skills required for employment in a wide variety of settings.²

Historically, a concern with this examination has been the student first-attempt pass rate. According to the 2008 BOC Annual Report,⁴ the percentage of candidates passing the entire examination on the first attempt in 2007–2008 was 39.1%. This is well below what many in the profession would expect, given that it reflects poorly on the educational institutions these students attended. However, this pass rate was based on the paper-and-pencil examination. The first-attempt pass rate in 2010–2011 on the computerized exam improved dramatically¹ to 82.3%. Although this was an improvement, having nearly 18% of the eligible candidates fail the exam on the first attempt is not the preferred outcome for those graduates of CAATE-accredited athletic training programs who did not pass on the first attempt.

The testing process is stressful, and students may believe that not passing the exam will make it difficult to obtain employment, a graduate assistantship, or an internship position. Unfortunately, this self-imposed pressure and the resulting anxiety can negatively impact their test-taking ability. Therefore, it is proposed that students' academic worry, locus of control, and method of coping (emotion-focused versus problem-focused) factor into their success on the BOC examination. Most recent studies related to the BOC examination have focused on its relationship to a student's type of clinical experience, the number of clinical hours earned, and his or her grade point average.^{5–9} Successful performance is often the product of complex relationships between skill and knowledge, mediated by perceptions of anxiety, self-confidence, and preparedness.¹⁰ To date, there have been no published studies examining anxiety/academic worry, methods of coping, and locus of control in athletic training students, but there is literature on both general test taking and medical students' performances on standardized tests.^{10–15}

Anxiety (Academic Worry)

Academic experiences, such as assessments and time in the classroom, adversely affect student performance when viewed as negative.^{11,16,17} Whereas some students have the ability to withstand these experiences, others' lack of ability to cope with performance expectations is manifested in worry.¹⁸ Worry and anxiety have been shown to be related to perceptions of competence,^{19,20} and an estimated 25% to 30% of high school and college students are affected by test or academic anxiety.^{21,22} Similarly, Cassady and Johnson¹⁵ found that high levels of cognitive test anxiety were associated with significantly lower standardized test scores in college students. Test anxiety has also been addressed by nursing educators, and programs have been developed to help students reduce the anxiety produced when taking the National Council Licensure Examination for Registered Nurses (NCLEX-RN).14,23

Coping

Coping, on the other hand, is a person's way of dealing with positive and negative life events. It is defined as "a complex set of processes directed toward moderating the impact of such events on their physical, social and emotional functioning."24(p140) There are important distinctions in the literature between emotion-focused and problem-focused coping.^{25,26} Though not mutually exclusive, individuals who choose more problem-focused coping strategies use behaviors designed to reduce or eliminate the problem in question. Thus, problemfocused coping is an effective means of reducing depression, anxiety, and anger.²⁷ A number of studies have shown the importance of coping style, with students who use an active or task (problem-focused) style being more academically successful than those who choose emotion-focused coping behaviors^{11,28} primarily designed to reduce or eliminate the negative emotional reactions associated with the problem rather than to directly address the cause. Paradoxically, these attempts to eliminate negative emotional states are ineffective and often lead to even greater negative feelings.²⁹

Students who use a more problem-focused coping style when preparing for the BOC examination may be able to alleviate negative aspects of the experience. This coping style may also assist in dealing with their emotions to produce a more favorable outcome. Conversely, if their coping style is primarily emotion-focused, the negative emotions may carry into the testing situation and negatively affect their results. A relationship between test anxiety and lower levels of problemfocused coping would be expected when a test-anxious individual is unable to remain focused on a task.^{30,31} For example, Edelmann and Hardwick³² found that emotionfocused coping is related to test anxiety and the tendency to experience task-irrelevant cognition.

Locus of Control

Locus of control is the extent to which people perceive that they control their own fate. Individuals' perceptions of the degree of control they have vary along a continuum ranging from internally to externally based.³³ Those with internal control believe that they are the masters of their fate and therefore are often confident, alert, and directive when controlling their external environments. Furthermore, they often perceive a strong link between their actions and consequences. On the other hand, those with external control believe themselves to have a passive role with regard to their environment. Therefore, they tend to attribute personal outcomes to luck. Internal locus of control has been found to be positively associated with academic success.³⁴

The purpose of this exploratory study was to examine the impact of coping method, locus of control, and academic worry on first-attempt passing rates on the BOC examination. It was hypothesized that low academic worry, internal locus of control, and problem-focused coping styles would be positively associated with success on the BOC examination.

METHODS

Participants

Before data collection, the Saint Louis University Institutional Review Board (IRB) approved this study (IRB No. 16108). We recruited athletic training students who sat for the BOC examination from April through October 2010, sending emails to CAATE-accredited entry-level program directors that asked them to forward the materials to their newly graduated students. The list of program directors was downloaded from the CAATE website (http://www.caate. net). A total of 145 (3%) of the 4334 possible participants completed the survey instrument, which was accessed via a web link embedded in the forwarded e-mail. All of the participants reported graduating from CAATE-accredited athletic training (AT) programs; there were 133 from baccalaureate programs and 12 from entry-level master's programs. Of these participants, 73% (n = 106) reported passing the BOC examination on the first attempt. After completing the survey instrument, participants were able to print and mail a raffle entry form for a chance to win one of eight \$50 prizes. Although the participants provided contact information on the entry form, the investigators had no ability to match the participants' entry forms with their survey data.

Instruments

The survey instrument included three sections of items used to measure the locus of control, method of coping, and academic worry. The Academic Locus of Control Scale for College Students³⁵ asked respondents to indicate, on an 8-point Likert

scale, how true or false the statements described their beliefs about 24 various academic issues. This scale is reported³⁵ to have a test-retest reliability of 0.92 and a Kuder-Richardson 20 internal consistency of 0.70. On The Focus of Coping Scale, developed by Billings and Moos,²⁴ respondents answered yes or no to 19 questions regarding their ability to deal with stressful events, like taking the BOC exam. The items were classified into two focus of coping categories, problem focused and emotion focused, which were established according to previous empirical and conceptual literature.³⁶ According to Folkman and Lazarus'³⁶ Ways of Coping instrument, this scale demonstrated adequate internal consistency with Cronbach alphas of 0.80 for the problem-focused scale and 0.81 for the emotion-focused scale in a communitybased population of adults. Both of these studies treated the scales independently, given that many participants used problem- and emotion-focused strategies simultaneously.^{24,36}

The 10-item Academic Worry Questionnaire assessed several domains of students' academic worry³⁷ by asking them to rate, on a 5-point scale, the degree to which they experienced worry prior to taking the BOC exam. This scale has demonstrated adequate internal consistency (Cronbach alpha = 0.87) and test-retest reliability (r = 0.83) in previous studies of college students.³⁷ The survey also addressed strategies, processes, and techniques used by the program and the students to prepare for the BOC examination. These items were based on common preparation methods observed by the authors in their work as athletic training educators. These included exam preparation courses and texts, the mock exams available through the BOC, and other subject-reported preparation methods.

Data Analysis

Before evaluating the relationship between the independent variables and first-attempt pass rate, the data were cleaned and the scales' psychometric properties evaluated. Items with negative wording were reverse coded and subscales were created as identified in the corresponding literature.^{24,35,37} The Academic Worry and Locus of Control scales were checked for internal consistency using the Cronbach alpha coefficient. This analysis was not run for Emotion-Focused Coping and Problem-Focused Coping because those scales measured the frequency of related behaviors that are not necessarily consistent with one another, and the use of an internal consistency measure is inappropriate. Correlations among the variable scales were then examined for relationships. Next, independent-samples t tests examined differences between those who did and those who did not pass the exam on the first attempt on each scale, as well as the items regarding the test-prep items used. Finally, a logistical regression examined the predictive value of the Emotion-Focused Coping and Problem-Focused Coping scales, the Locus of Control scale, and/or the Academic Worry scale on the dichotomous outcome of first-attempt passing rate. Statistical significance was set at P < .05 for all analyses, and all computations done using SPSS for Windows (version 16; SPSS Inc, Chicago, IL).

RESULTS

Correlation coefficients showing the relationships among the scores for Academic Worry, Locus of Control, Emotion Focus, and Problem Focus are shown in Table 1. Increased

Table 1. Correlations (N = 145)

	Emotion Focus	Problem Focus	Locus of Control Score	Worry Score
Emotion focus				
Pearson correlation Significance (2-tailed)	1	.087 .296	262 [*] .001	.307 [*] .000
Problem focus				
Pearson correlation Significance (2-tailed)	.087 .296	1	.089 .289	.155 .062
Locus of control score				
Pearson correlation Significance (2-tailed)	262* .001	.089 .289	1	229 [*] .006
Worry score				
Pearson correlation Significance (2-tailed)	.307* .000	.155 .062	229* .006	1

** Correlation is significant P = .01 level (2-tailed).

emotional focus correlated to decreased (more internal) locus of control (P = .001) and increased academic worry scores (P= .00). Similarly, an increased academic worry score correlated to increased emotional focus (P = .00) and a decreased (more internal) locus of control (P = .006). However, increased (more external) locus of control correlated to decreased emotional focus (P = .001) and decreased academic worry (P = .006). There were no significant correlations found between increased problem focus and the other scores.

Although both the Locus of Control ($\alpha = 0.71$) and Academic Worry ($\alpha = 0.79$) scales showed adequate internal consistency, this calculation was not run for Emotion-Focused Coping and Problem-Focused Coping because those scales measured the frequency of related behaviors that are not necessarily consistent with one another.

The results of the logistic regression analysis suggested that the full model significantly predicted passing on the first attempt ($\chi_4^2 = 15.346$, P = .004). The model accounted for 10% to 15% of the variance. Overall, 96.2% of the participants who passed on the first attempt and 25.6% of those who did not pass on the first attempt were correctly classified (77.2% of the total participants were correctly classified). It is likely that the lower explanatory power of the "did not pass on first attempt" group is due to the small sample size of that group. As shown in Table 2, the values of the coefficients indicated that a 1point increase in Locus of Control score was associated with increased odds of passing on the first attempt (adjusted odds ratio = 1.033). No other covariate was found to be significant.

The results of the t tests (Table 3) indicated that, compared with those who passed the test on the first try, those who did not pass on the first attempt had significantly lower scores on the Emotion-Focused Coping scale (P = .024). There were no significant differences on the Problem-Focused Coping scale between those who passed the test on attempts after the first and those who had not yet passed the test. Frequency of responses to individual items, subdivided by emotion focused and problem focused on the Ways of Coping scale, are shown in Table 4. In keeping with the original authors' article, item 11 was not included on either of the scales.²⁴ However, those who passed on the first attempt did have a higher mean score on several study variable scales than those who did not pass on the first attempt (Table 3). When compared with those who passed the test on the first attempt, those who did not pass on the first attempt exhibited more external locus of control (P =.002) and greater academic worry (P = .026).

Although not statistically significant, the *t* test means approached significance for participants who answered no to the questions "Did teaching faculty prepare you well?" and "Did clinical instructors prepare you well?" (Table 5). Results of the *t* tests also indicated no difference in the number of prep items used between those who passed on the first attempt and those who did not pass on the first attempt. However, the data also suggested a normal distribution for the total number of types of exam prep techniques used by both first-attempt

Table 2. Logistic Regression Analysis										
							95% CI for Exp(B)			
	В	SE	Wald	df	Significance	Exp(B)	Lower	Upper		
Emotion focus	-2.055	1.602	1.645	1	.200	0.128	0.006	2.960		
Problem focus	1.648	1.163	2.008	1	.156	5.197	0.532	50.793		
Locus of control score	0.033	0.015	4.719	1	.030	1.033	1.003	1.064		
Worry score	-0.055	0.037	2.255	1	.133	0.946	0.881	1.017		
Constant	-2.361	2.304	1.050	1	.305	0.094				

Table 2 Logistic Regression Analysis

Abbreviations: CI, confidence interval; ExpB, odds ratio.

Table 3. Descriptive Statistics

	First-A	First-Attempt Pass First-Attempt Not Pass					t Test Comparisons Between First-Attempt Passing and First- Attempt Not Passing Students		Total		
Variables	Mean	SD	n	Mean	SD	Ν	Р	Mean	SD	n	α
Coping											
Emotion focused Problem focused	0.50 0.82	0.13 0.17	106 106	0.55 0.78	0.12 0.18	39 39	.024 .248	0.51 0.81	0.13 0.17	145 145	-
Locus of control Academic worry	127.79 15.68	12.77 4.90	106 106	119.69 18.00	16.74 6.88	39 39	.002 .026	125.61 16.30	14.34 5.57	145 145	0.71 0.79

passers and the others, with the majority of both groups having used two prepping techniques.

DISCUSSION

The goal of this exploratory study was to understand the relationship between locus of control, method of coping, academic worry, and first-attempt passing rates on the BOC examination. Unfortunately, the participants who did not pass the BOC exam on the first attempt were underrepresented in the sample. Due to that fact, the different groups may or may not represent the population at large, and the findings should be taken as preliminary results. Replication of this study with a larger randomized sample would help to confirm these results.

The findings suggest that academic worry and emotionfocused coping methods may have some effect on those who do not pass the exam on the first attempt. These data are consistent with findings by Ames,¹⁶ Struthers et al,¹¹ and Weiner¹⁷ that worry about various academic experiences perceived as negative could have an adverse effect on student performance. It appears that the results also show that those students who used more emotion-focused coping methods to deal with situational stress were more likely to fail the examination, whereas those who used a more problemfocused coping strategy were more successful. Building selfefficacy through BOC examination rehearsal and reinforcing positive coping behaviors may effect success on the first attempt. The results also showed that students who did not pass on the first attempt felt that academic and clinical faculty could have done more to prepare them for the BOC examination (Table 5).

Although previous studies indicated that a more internal locus of control was associated with academic success,³⁴ our results did not replicate them. On the contrary, respondents with a more external locus of control tended to pass on the first attempt at a higher rate than those with an internal locus of control. This may be due to either the small sample size or

	First-Attempt Pass			First-Attempt Not Pass		
	No	Yes	% Yes	No	Yes	% Yes
Emotion-focused coping						
Tried to see positive side.	7	99	93	1	38	97
Tried to step back from the situation and be more objective.	15	91	86	6	33	85
Prayed for guidance or strength.	37	69	65	8	31	80
Exercised more.	61	45	43	23	16	41
Prepared for the worst.	43	63	59	14	25	64
Sometimes took it out on other people when I felt angry or depressed.	71	35	33	21	18	46
Tried to reduce tension by smoking more.	104	2	2	38	1	3
Tried to reduce tension by eating more.	90	16	15	33	6	15
Kept my feelings to myself.	76	30	28	20	19	49
Got busy with other things in order to keep my mind off the situation.	59	47	44	14	25	64
Didn't worry about it; figured everything would probably work out fine.	64	42	40	27	12	31
Problem-focused coping						
Took things one step at a time.	5	101	95	7	32	82
Considered several alternatives for handling the problem.	25	81	76	6	33	85
Drew on my past experiences; I was in a similar situation before.	30	76	72	9	30	77
Tried to find out more about the situation.	9	97	92	8	31	80
Talked with a professional person about the situation.	24	82	77	10	29	74
Took some positive action.	6	100	94	3	36	92
Talked with a spouse or relative about the situation.	34	72	68	16	23	59

Table 4. Frequency Table–Coping

Table 5. Preparation by Faculty

	No	% No	Yes	% Yes	Other	% Other
Do you feel that the teaching faculty of yo examination?	ur athletic t	raining educa	ation prograr	n prepared yo	u well to take	the BOC
First-attempt pass (n = 106) First-attempt not pass (n = 39)	2 10	2 26	98 24	92 62	6 5	6 13
Do you feel the clinical instructors of your examination?	athletic trai	ning educatio	on program	prepared you v	well to take th	e BOC
First-attempt pass (n = 106) First-attempt not pass (n = 39)	0 7	0 18	103 28	97 72	3 4	3 10

additional, unexplored individual differences within our self-selected sample.

Limitations

This study begins to show the basis for a strategy to help students prepare for success on the BOC examination, similar to what is in place in nursing education. That program, known as KATTS, addresses the following: knowledge base, anxiety control, and test-taking skills. It is a strategy that is program based and has improved NCLEX-RN success from 85% in 2000, the year before KATTS was initiated, to 97% from 2001–2006 when the program was put into place. The KATTS program uses personal wellness strategies, individualized review techniques, and practice/rehearsal routines in a positive context to help prepare nursing students for the NCLEX-RN.¹⁴

An example of this approach in athletic training would embed this strategy into a seminar class taken in a program's last semester to prepare students for either the November or April BOC examination dates. Self-efficacy and academic worry are addressed by identifying their knowledge base, including perceived student strengths and weaknesses. This process begins in the first week of the semester when students complete a "confidence survey" based on the 6th edition of *Athletic Training Role Delineation Study and Practice Analysis.* This document provides the basis for the items in the BOC examination. The students then complete a 100-question quiz from an exam preparation text, and the results are compared with the confidence surveys. This provides an explicit foundation for addressing individual strengths and weaknesses in the exam preparation process.

Test anxiety and test-taking strategies on computerized standardized examinations are also addressed through rehearsal. Approximately 1 week after the initial assessment of strengths and weaknesses, the students take a mock exam using a practice exam purchased from the BOC. These exams take place in a computer lab to simulate the actual testing process. The students review their results with the instructor for additional study strategies. Students usually take a second mock exam later in the semester, after spring break, and generally perform much better. It is felt that this process, similar to what has been done by nursing educators, decreases test-taking anxiety, increases self-efficacy regarding competence in athletic training, and empowers students to take an active role in BOC examination preparation.^{14,23} The focus is neither for students to "cram" nor for instructors to "teach to the test," but rather to provide the students the cognitive and emotional feedback necessary to give them confidence when taking this important high-stakes examination.

A major limitation of this study is that the number of candidates who did not pass the BOC exam on the first attempt is underrepresented. Due to this imbalance, the sample may or may not relate to the population at large, and a larger sample is necessary for future studies to confirm our findings. Because students in this study volunteered to participate after learning their passing status, it is possible that those who passed the examination were more likely to participate in the survey than those who were not successful. The sample also included a limited number (12) of students from entry-level master's programs. Furthermore, demographic information such as age and gender were not included in this survey to prevent identifying respondents. Future studies should examine these variables as well.

Need for Future Study

Due to the small, unbalanced sample, replication of this study with a larger randomized sample is necessary to confirm the results. The following questions also need to be addressed:

- 1. What factors influence the relationship between candidates' locus of control with regard to first-attempt success on the BOC exam?
- 2. Are students who use problem-focused coping and who have less academic worry more likely to persist in rigorous CAATE-accredited athletic training programs?
- 3. Can CAATE-accredited athletic training programs prepare students better for the BOC exam both pedagogically and emotionally?

Future studies could also examine self-efficacy, gender, academic performance, and program-related preparation strategies. Qualitative data may be necessary to understand how the student truly responds to the challenge of this high-stakes examination.

Conclusion

The BOC examination has been athletic training's professional gatekeeper for decades. Data from this exploratory study are consistent with prior studies that suggested that psychological factors such as academic worry and emotion focused coping relate to a lower first attempt pass rate on the examination. However, there is disagreement between previous studies and this one on locus of control. Our data suggest that there is decreased (more internal) locus of control in candidates that did not pass the BOC examination on the first attempt, where previous studies would predict an opposite relationship. These data also suggest that students who pass on the first attempt use multiple strategies to prepare for the exam. We felt the results of this preliminary study suggest that CAATE-accredited entry-level programs can help students prepare better psychologically for the BOC exam, and we have suggested a process to help them pass the BOC exam and become athletic trainers.

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