Technical Report 1383

Validation of the Cadet Background and Experience Form (CBEF) to Support Army ROTC Personnel Assessment (2015–2018)

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June 2020

United States Army Research Institute for the Behavioral and Social Sciences

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REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy)	2. REPORT TYPE	3. DATES COVERED (from. . . to)
xx-05-20	Technical	May 2015–May 2018

4. TITLE AND SUBTITLE	5a. CONTRACT OR GRANT NUMBER
Validation of the Cadet Background and Experience Form (CBEF) to Support Army ROTC Personnel Assessment (2015-2018)	W911NF-15-C-0064
	5b. PROGRAM ELEMENT NUMBER: 622785
6. AUTHOR(S): Bethany H. Bynum and Mark C. Young	5c. PROJECT NUMBER: A790
	5d. TASK NUMBER
	5e. WORK UNIT NUMBER: 311
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES): Human Resources Research Organization, 66 Canal Center Plaza, Suite 700, Alexandria, Virginia 22314	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES): U.S. Army Research Institute for the Behavioral and Social Sciences, 6000 6th Street (Building 1464/Mail Stop: 5586), Fort Belvoir, VA 22060-5586	10. MONITOR ACRONYM: ARI
	11. MONITOR REPORT NUMBER: Technical Report 1383

12. DISTRIBUTION/AVAILABILITY STATEMENT:

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

ARI Research POC: Mark C. Young, Selection and Assignment Research Unit

14. ABSTRACT *(Maximum 200 words)*:

This report covers research conducted in 2015–2018 by the U.S. Army Research Institute for the Behavioral and Social Sciences that extends an ongoing program of research initiated in 2007. The initial goal was to develop a new non-cognitive measure, the Cadet Background and Experience Form (CBEF), to help inform the award of ROTC four-year scholarships. The operational CBEF continues to perform well for this purpose. The revised CBEF composite, which was implemented for candidates applying for the 2016-2017 academic year, has consistently higher levels of validity relative to the original composite. In addition, the new composite is shown to demonstrate incremental validity for predicting cadet withdrawal through the four years of ROTC enrollment. This report also describes the results from CBEF testing of cadets at the ROTC Summer Advanced Camp. These data collections were critical to the development of a new "on-campus" CBEF which has been implemented for awarding two- and three-year scholarships. Advanced Camp also permits the validation of the CBEF (and other USACC metrics) against subsequent job performance and career advancement (e.g., battalion command). This research will help USACC to award scholarships to those most likely to have a successful officer career and will provide insights about the most important aspects of pre-commissioning training.

15. SUBJECT TERMS

Personnel Testing, Validation, Attrition, ROTC Continuance, Biodata, Personality, ROTC Scholarships

SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON (Name and Telephone Number)
16. REPORT	17. ABSTRACT	18. THIS PAGE			
Unclassified	Unclassified	Unclassified	Unlimited	117	Tonia S. Heffner (703) 545-4408

Standard Form 298

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ACKNOWLEDGEMENTS

The authors would like to acknowledge the support that the U.S. Army Cadet Command (USACC) has provided for this research program. We dedicate this work to the young men and women in ROTC nationwide who are making considerable sacrifices to become the Army's leaders of tomorrow.

VALIDATION OF THE CADET BACKGROUND AND EXPERIENCE FORM (CBEF) TO SUPPORT ROTC PERSONNEL ASSESSMENT (2015–2018)

EXECUTIVE SUMMARY

Research Requirement:

ROTC is the primary commissioning source for Army officers and produces approximately half of its senior leaders who become General Officers. The U.S. Army Cadet Command (USACC) manages the four-year national ROTC scholarship program to encourage highly qualified high school seniors to become Army officers. Approximately 2,000 scholarships are awarded to entering ROTC students each year, and a significant portion will eventually drop out of the program. This disenrollment creates substantial costs to the Army, as the training for each Cadet costs approximately $21,000 per year.

In 2007, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) began a series of research projects to develop, evaluate, and implement the Cadet Background and Experience Form (CBEF) for improving the selection of four-year ROTC scholarship recipients. The CBEF is a self-report biodata measure of motivational attributes (e.g., Achievement Orientation, Army Identification, Fitness Motivation) relevant to cadet/officer performance and service continuance. Research findings have shown that the CBEF is a valid predictor of key ROTC training outcomes such as disenrollment, school performance, physical fitness, ranking on the ROTC commissioning National Order of Merit List (OML), and performance in the ROTC Summer Advanced Camp. Accordingly, the CBEF has been used operationally in the ROTC scholarship award process for high school students since 2012. Prior to including the CBEF as part of the scholarship assessment, there had been a heavy emphasis on the evaluation of cognitive skills (SAT/ACT scores, high school grade point average). Adding CBEF to the process has allowed for more of a holistic assessment by capturing critical motivational attributes important to both continuance and performance in ROTC—as well as the Army.

There has been a critical need to carefully monitor and evaluate the performance of the CBEF among operational four-year scholarship and research samples of ROTC cadets and officers on an ongoing basis. This is important to assist the USACC in optimizing and refining its selection procedures for four-year scholarships—as applicant populations and Army policies change over time. The longitudinal testing and tracking of ROTC cadets, who applied for the four-year scholarship, (a) helps inform how the CBEF might be improved and potentially expanded for operational use with other types of scholarships (e.g., non-four-year scholarship cadets), (b) makes it possible to evaluate the performance of the CBEF in predicting longer-term officer career outcomes beyond the point of commissioning (e.g., officer promotions and continuance through and beyond the Active Duty Service Obligation; ADSO), and (c) provides a test bed for evaluating new measures which might eventually serve to enhance the operational performance of CBEF as an officer selection and assessment tool.

In May of 2015, ARI awarded a three-year contract to the Human Resources Research Organization (HumRRO) to assist with (a) continuing the longitudinal evaluation of the CBEF

using both operational and research data, and (b) exploring ways to enhance the performance of CBEF for supporting ROTC personnel assessment needs. This document reports the results of activities conducted in support of these objectives from 2015 to 2018.

Procedure:

To provide a more efficient means for conducting validation analyses, we developed an integrated longitudinal multi-cohort data file. This continually updated/expanding file incorporates data collected across applicant/cadet cohorts and includes the rich array of both predictors (e.g., ACT/SAT, CBEF items, scales, and composite measures) and criterion measures (ROTC performance and outcomes) collected over time. The most current multi-cohort data file includes data from eight annual four-year scholarship application cycles (for the 2010/2011 through 2017/2018 academic years) and eight years of the ROTC Summer Advanced Camp (for the summers of 2010–2017).

Over the course of this project, we focused particular attention on the evaluation of our new operational CBEF composite (v2.0) which was developed in 2015. This composite became operational for the 2016/2017 academic year as part of the four-year ROTC scholarship evaluation process. We cross-validated the new composite on an independent hold-out sample. We also performed analyses to examine whether the validity of the CBEF against first-year ROTC withdrawal might be improved by using several alternative models of consensus-based scoring.

At the request of the USACC in 2017, we developed an on-campus CBEF for their use in informing the award of two- and three-year scholarships to cadets who are already enrolled in the ROTC program. CBEF data that had been collected from cadets across multiple years at the ROTC Summer Advanced Camp were used in the development of this new form. The form was designed specifically to predict overall performance in the ROTC program.

Findings:

The results over the past three years of our current research program have confirmed that the operational testing of the CBEF for awarding four-year scholarships continues to shows some level of validity This finding is positive, given that the testing is taking place on such a large scale, in a very high-stakes environment, and without the benefit of proctoring (as the test is completed online). In addition, the key outcomes we are predicting (e.g., program withdrawal, grade point average, Army Physical Fitness Test scores, ranking on the national Order of Merit List) occur years after applicants complete the CBEF as a part of the scholarship application package. The psychometric properties of the operational CBEF continue to hold up over time, and the correlations of individual scales against conceptually related criteria are generally consistent with expectations. Most importantly, the new CBEF composite (v2.0) was cross-validated using data from the cadet cohorts who began ROTC in 2014–2016. The validity evidence supporting the new composite as a predictor of withdrawal is robust, and the measure is clearly an improvement over the previous composite (v1.0). In addition, none of the alternative models involving consensus-based scoring which we examined showed higher validity against ROTC withdrawal, although there are some indications that Profile Similarity Metrics (PSMs)

could be used to re-score the CBEF to further improve the test's validity (Legree et al., 2014; Legree, Purl, et al., 2019).

Using research data collected from cadets at the ROTC Summer Advanced Camp (2014–2016) we also successfully created a new on-campus CBEF form shown to have validity for predicting overall ROTC performance as reflected by the commissioning Order of Merit List (OML). This form minimizes item overlap with the High School (four-year scholarship) version and also minimizes the disparate impact on gender/racial subgroups. The form will need to be validated in the future under "high stakes" operational conditions in which on-campus cadets complete this CBEF form as part of their two- and three-year scholarship assessment process.

Utilization and Dissemination of Findings:

Findings from this effort provide empirical support for the continued use of the CBEF for informing the award of four-year scholarships to high school seniors. Based on these positive findings, there are no immediate plans to revise the operational CBEF composite (v2.0). We have recommended that the USACC continue to use this operational CBEF on an ongoing basis.

Under this effort, ARI delivered the new On-Campus CBEF and scoring algorithm to USACC in 2017 and USACC implemented this test in September 2019 at ROTC programs nationwide. This 92-item CBEF requires about 15 to 20 minutes for scholarship candidates to complete on USACC's online platform and the On-Campus CBEF contributes points toward the overall scholarship Order of Merit List used for making the scholarship awards.

From a Talent Management perspective, testing 5,000 to 6,000 ROTC cadets at the Advanced Camp also permits the validation of the CBEF (and other USACC metrics, such as academic major, course grades, and Professor of Military Science evaluations of the cadets) against subsequent job performance and career advancement (e.g., achieving battalion command). Eventually, this research will help USACC to award scholarships to those most likely to have a successful officer career instead of to those who merely do well in ROTC. Linking ROTC metrics to long-term officer outcomes also could provide insights about the most important aspects of pre-commissioning training, which in turn might lead to program improvements through additional emphasis on these elements. This research also would make it possible to revise the calculation of the ROTC OML so that it is a better indicator of future officer success. As of now, the earliest ROTC cohort is reaching the 9-year career mark, which means that the first substantive quality career indicator (i.e., CGSC residency) will be available as a criterion soon.

Findings presented in this report have been briefed to MG Christopher P. Hughes, Commanding General, USACC and BG Patrick D. Frank, Deputy Commanding General, USACC. They also have been presented at the International Military Testing Association.

VALIDATION OF THE CADET BACKGROUND AND EXPERIENCE FORM (CBEF) TO SUPPORT ROTC PERSONNEL ASSESSMENT (2015–2018)

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CHAPTER 1: INTRODUCTION

Bethany H. Bynum (HumRRO), Mark C. Young, Peter J. Legree, and Robert N. Kilcullen (ARI)

Background

The Reserve Officer Training Corps (ROTC) is an essential commissioning source for the United States Army. To fulfill its role to the Army's mission, the United States Army Cadet Command (USACC) needs to select students for the ROTC program who are likely to complete and excel in the program, excel as junior officers, stay beyond their Active Duty Service Obligations (ADSOs), and subsequently excel as senior officers.

An important avenue into ROTC is the four-year high school scholarship program, whereby high school students apply for four-year college scholarships to ROTC programs hosted by colleges across the United States. The USACC manages the four-year national ROTC scholarship program to encourage highly qualified high school seniors to become Army officers. Approximately 2,000 scholarships are awarded to entering ROTC students each year. About half the scholarships provide financial support for four years. The remaining scholarship awardees receive benefits beginning in their sophomore year. A significant portion (10–20%) of cadets entering ROTC with a scholarship eventually will drop out of the program—especially within the first two years. Thus, disenrollment from the scholarship program creates a significant cost to the Army in terms of lost scholarship money (over $21,000 per student per year), lost training time/resources, and lost opportunities for awarding scholarships to others who might have otherwise completed the program and become successful officers.

At the start of this effort, research indicated that officers commissioned through the ROTC four-year scholarship program left the Army after their initial ADSO at the same or somewhat higher rates than officers from other commissioning sources (Doganca, 2006). Furthermore, those awarded four-year scholarships tended to be less likely to complete the ROTC program and become commissioned officers than other or non-scholarship winners. As a result, the U.S. Army Research Institute for Behavioral Sciences (ARI) initiated a series of research projects in 2007 to develop, validate, and implement the Cadet Background and Experiences Form (CBEF)—a biodata-based measure designed to augment the selection process of four-year ROTC scholarship recipients and reduce the rate of disenrollment from the ROTC program.

The ROTC typically consists of three to four years of military training overlapping with cadets' completion of a bachelor's degree at colleges and universities across the country. Cadets can enter ROTC as freshmen or sophomores and are required to take military science courses. Cadets who receive an Army ROTC scholarship and continue into their sophomore year, and Cadets who enroll in advanced courses (junior and senior year), regardless of scholarship status, must sign a contract agreeing to eight years of service in the U.S. Army. As part of the commissioning process, cadets typically attend the ROTC Summer Advanced Camp after their

junior year of college. Cadets then are ranked based on their academic, leadership and physical performance during ROTC and Advanced Camp, with higher ranking cadets more likely to become active duty officers in their preferred branch. Upon completion of ROTC, cadets are commissioned as Second Lieutenants serving as active duty officers or as officers in the Army National Guard or Army Ready Reserve.

Four-Year High School Scholarship Application Process

The four-year scholarship application process is separate from the process to enter ROTC. Not everyone who enters ROTC necessarily applies for a four-year scholarship. Each year, about 6,000 completed applications are reviewed for approximately 2,000 available scholarships. Candidates are considered eligible if (a) they are a U.S. citizen between the ages of 17 and 26, (b) they have a high school grade point average (GPA) of 2.5 or greater, (c) their composite American College Testing (ACT) score is greater than or equal to 19 or their combined Scholastic Assessment Score (SAT; Math and Verbal) score is greater than or equal to 920, and (d) they meet physical standards.[1] Eligible candidates are then interviewed in cycles, either at a local ROTC program or at the school they are interested in attending. Interviews are conducted by a panel of professors of military science (PMS) who complete an interview form which is forwarded to USACC. When a sufficient number of interviews have been completed, selection boards are convened to review applications and assign a Whole Person Score (WPS) to each applicant. The maximum total WPS score is 1,400 points and consists of: (a) SAT/ACT score, which is allotted a maximum of 250 points; (b) Scholar-Athlete-Leader (SAL) scores[2] based on the four-year application, which are allotted a maximum of 200 points; (c) PMS interview scores, which are allotted a maximum of 200 points; (d) promotion board scores, which are allotted a maximum of 350 points, (e) the CBEF score, which is allotted a maximum of 250 points; and (f) the Physical Fitness Assessment[3] (PFA) score, which is allotted a maximum of 150 points. The CBEF and the PFA were added to the WPS in 2012. Prior to 2012 the WPS consisted of SAT/ACT scores, SAL scores, and PMS interview scores (the maximum total WPS was 1,000 points).

Three types of scholarship awards are made as part of the four-year high school scholarship program. These include:

- Traditional four-year (4R): A 4R scholarship pays benefits for four years starting with a cadet's freshman year.
- Three-year advanced designee (3D): A 3D scholarship is part of the four-year scholarship program but does not pay benefits in the first year. For benefits to start, a cadet must (a) be enrolled in ROTC classes during the entire first year and successfully complete the first year of Military Science courses, (b) have achieved a 2.5 or higher college GPA and a 3.0 ROTC GPA at the end of their Military Science courses, (c) qualify, medically and

[1] Scholarship Applicants are required to complete the Presidential Challenge Physical Fitness Tests which include sit-ups, pushups, curl-ups, and a 1- mile run.

[2] Scholar-Athlete-Leader scores reflect ROTC's desire for cadets who excel at academics, are athletic, and serve in leadership positions.

[3] The Physical Fitness Assessment consists of 1 minute of pushups, 1 minute of curl-ups, and a 1-mile run.

administratively, and (d) pass the Army Physical Fitness Test (APFT) prior to contracting.

- Four-year historically black colleges and universities (HBCU; QE): A QE scholarship is a four-year scholarship given at HBCU.

Based on the WPS, USACC places applicants on a scholarship Order of Merit List[4] in descending order, with the highest WPS receiving the highest rank. Scholarships are extended in a top-down fashion, with the highest scores awarded 4R scholarships and then the next highest scores awarded 3D scholarships. The number of offers made and the type of scholarship offered is based on a variety of factors including the quality of applicants, the number of slots to be filled, and the available funds. Offers are made for up to three schools to which the applicant has applied for admission. If the applicant fails to get into the schools on his/her list, or decides to attend a different institution, USACC has the flexibility to make alternate accommodations. Once an offer is made, the student has 30 days to accept or decline. If no response is received, the offer is withdrawn. Students who are not made an offer may be reconsidered by subsequent selection boards based on their original application and resulting scores.

Augmenting the Whole Person Score

Though the original WPS was predictive of performance-related outcomes such as cadets' cumulative GPA, college APFT scores, and performance in ROTC's capstone Leader Development and Assessment Course (LDAC; now called Advanced Camp), research has historically indicated that the original components of the WPS (i.e., SAT/ACT scores, SAL scores, PMS interview scores, and promotion board scores) were not strong predictors of cadet disenrollment (Putka, 2009). Moreover, in recent years, ARI's research has shown that the WPS has not predicted ROTC continuance. It should be noted, however, that the WPS was originally created by the USACC to predict performance in ROTC (not continuance). The overarching goal of ARI's original research effort was to establish validity evidence for a selection measure designed to (a) identify applicants most likely to complete the ROTC program and fulfill their ADSO, and (b) complement the existing components of the WPS. With those objectives in mind, ARI developed the CBEF, a biodata-based measure designed to augment the selection process of four-year ROTC scholarship recipients and reduce the rate of disenrollment from the ROTC program (Kilcullen et al., 2009).

Development and Evolution of the Cadet Background and Experience Form

Though the CBEF has undergone various revisions over the past eight years, the current CBEF form consists of a set of rationally-keyed biodata scales designed to assess various temperament constructs hypothesized to relate to cadet and officer retention. Table 1.1 provides a listing of the content measured by the four-year scholarship CBEF. The four-year scholarship CBEF consists of six core scales and several experimental scales.

[4] A second Officer of Merit List is used to rank cadets for commissioning. These lists are different but are referred to using the same language. All future references to the OML correspond to the list used to rank cadets for commissioning.

Table 1.1. Content of the Four-Year Scholarship CBEF

	Form 1 (Feb 2009-Feb 2011)	Form 2 (Feb 2011-Feb 2014)	Form 3 (Jun 2014-Feb 2015)	Form 4 (Jun 2015-Feb 2017)	Form 5 (Jun 2017-Present)
Core CBEF Biodata Scales					
Army Identification	X	X	X	X	X
Achievement	X	X	X	X	X
Fitness Motivation	X	X	X	X	X
Hostility to Authority	X	X	X	X	X
Stress Tolerance	X	X	X	X	X
Response Distortion (Lie)	X	X	X	X	X
Experimental CBEF Biodata Scales					
Coachability		X			X
Equity Sensitivity		X			
Past Withdrawal Propensity	X		X	X	X
General Self-Efficacy	X	X	X	X	
Goal Orientation-Continuance			X	X	X
Hostility to Authority Maturity		X	X	X	X
Instrumentality of Army to Career Goals	X				
Interest in Leadership		X	X		
Locus of Winning					X
Manipulativeness	X				
Peer Leadership		X	X	X	X
Tolerance for Injury	X		X	X	
Written Communication				X	X

CBEF Composite

The core CBEF scales are combined to form a weighted composite score ranging from 0 to 250 points, which contributes to each four-year scholarship applicant's WPS. In 2009, when the CBEF composite score (v1.0) was first developed, it consisted of five scales that were weighted optimally to the predict first-year disenrollment. The initial version of the CBEF composite was based on data that was collected from research samples in 2007 and 2008 (Putka, 2009). In 2015, we updated the CBEF composite (v2.0) using a sample of operational data collected from applicants of the 2012–2013 academic year through the 2015–2016 academic year. This sample was limited to cadets in the 4R scholarship category and for whom first-year disenrollment data were available. The new composite included the five scales included on the previous composite and a response distortion scale, which is intended to identify applicants who are not responding honestly. The six scales were weighted optimally to predict withdrawal from ROTC. This new composite became operational for candidates applying for the 2016–2017 school year, and it continues to be used as a component of the WPS.

The USACC began administering the High School CBEF to all four-year scholarship applicants beginning in November 2009. For the four-year scholarship applicant cohorts who applied to begin ROTC as a freshman in 2010 (F10) and as a freshman 2011 (F11), the CBEF

was not used to make operational decisions. See Table 1.2 for the application windows of all applicant cohorts. The CBEF was officially scored and used for selection beginning with the applicants who applied to begin ROTC as freshman in 2012 (F12) and contributed a maximum of 250 points to applicants' WPS. CBEF v1.0 was used to make selection decisions for the F12–F14 cohorts. CBEF v2.0 composite started being used to make selection decisions with the F15 cohort and is currently used for selection decisions. Table 1.2 summarizes the application dates, CBEF version, and operational use by cohort.

Table 1.2. Application Dates and High School CBEF Versions by ROTC Four-Year Scholarship Cohort

Cohort	F10	F11	F12	F13	F14	F15	F16	F17
Application Dates	Nov. 2009-Feb. 2010[a]	Feb. 2010-Feb. 2011	Feb. 2011-Feb. 2012	Feb. 2012-Feb. 2013	Feb. 2013-Feb. 2014	Jun. 2014-Feb. 2015	Jun. 2015-Feb. 2016	Jun. 2016-Feb. 2017
ROTC/College Start	Fall Semester 2010	Fall Semester 2011	Fall Semester 2012	Fall Semester 2013	Fall Semester 2014	Fall Semester 2015	Fall Semester 2016	Fall Semester 2017
CBEF Version	CBEF Form 1	CBEF Form 1	CBEF Form 2	CBEF Form 2	CBEF Form 2	CBEF Form 3	CBEF Form 4	CBEF Form 4
CBEF composite			CBEF v1.0	CBEF v1.0	CBEF v1.0	CBEF v2.0	CBEF v2.0	CBEF v2.0
Operational Use	Research	Research	Operational	Operational	Operational	Operational	Operational	Operational

[a] CBEF data for the F10 cohort was only collected for 4 months of the 12-month application cycle, November 2009–February 2010.

Previous Research

Early research on the CBEF focused on evaluating its basic psychometric properties and establishing evidence of its criterion-related validity for predicting retention-related outcomes, such as disenrollment and four-year scholarship awardees' intentions to make the Army a career (Putka, 2009). Subsequent research focused on evaluating the CBEF's validity for predicting performance-related outcomes, particularly cadets' performance at Advanced Camp, along with their college GPA and APFT scores (Bynum & Legree, 2014). Much of this early research was based on CBEF data gathered under experimental, rather than operational, conditions. In other words, it was completed by cadets under the assumption that the data would be used for research purposes only, not used to make operational decisions (e.g., awarding scholarships). Under those experimental conditions, the CBEF was a valid predictor of both cadet disenrollment and performance-related outcomes. For clarity, some of the major milestones and events associated with this large longitudinal project are presented in Table 1.3.

Table 1.3. Major Milestones and Events Pertaining to ARI's Research Program Supporting the USACC's Personnel Assessment Requirements

Year	Milestone / Event
2007	USACC requested ARI's assistance with assessing candidates for four-year ROTC scholarships. ARI initiated a large research program to support USACC's personnel assessment needs.
2008	ARI developed an initial prototype of the Cadet Background and Experiences Form (CBEF) for assessing the motivational attributes of applicants/cadets.
2010	CBEF data were collected from four-year scholarship applicants under operational conditions (beginning for the 2011/2012 academic year), but it was not used yet to inform selection decisions. ARI began a yearly testing program at the ROTC Summer Advanced Camp. Cadets are administered the CBEF with additional experimental items in order to evaluate new measures to further improve the prediction of cadet continuance and performance.
2011	The High School CBEF is first used operationally as a component of USACC's Whole Person Score (WPS) for awarding four-year scholarships (began for the 2012/2013 academic year).
2014	USACC and ARI sign a memorandum of understanding (MOU) initiating ARI's talent management research program to improve ROTC branch assignment policy. (The details of this initiative are not covered in the current report and will be documented in future reports).

(continued)

Table 1.3. (Continued)

Year	Milestone / Event
2016	Revised CBEF composite (v2.0) replaced the original operational composite (v1.0) for awarding scholarships (began for the 2016/2017 academic year). At USACC's request, ARI completed analyses to evaluate the multiple cognitive tests administered to cadets who attended the 2016 Summer Advanced Camp. ARI's analyses and recommendations were used to inform current cadet assessment policies. (The details of this effort were shared with USACC in NOV 2016 and are not covered in the current report). USACC asks ARI to develop an on-campus CBEF to inform the award of two- and three-year scholarships to cadets already enrolled in ROTC.
2017	ARI developed an On-Campus CBEF prototype designed to predict ROTC performance. This measure & scoring algorithm were delivered to USACC for a future implementation at ROTC campuses nationwide.
2019	USACC implemented the On-Campus CBEF as a computer-based test with ARI support.

Early operational research showed positive results for the functioning of the CBEF composite score among applicants (Bynum & Legree, 2014). Specifically, operational CBEF composite scores (a) were reliable and normally distributed among applicants, (b) had low correlations with the CBEF Response Distortion scale, (c) did not exacerbate subgroup differences associated with the previous WPS composite, and (d) exhibited meaningful patterns of correlations with components of the WPS (e.g., Scholar, Athlete, Leader points).

Early evaluations of the criterion-related validity generally were positive. The CBEF composite made a consistent contribution to the prediction of disenrollment and APFT scores. However, the relationship varied by cohorts. The variability in the magnitude of validity coefficients is likely the result of differences in the number of four-year scholarships awarded, the distribution of 4R and 3D awards, and when those awards were made.[5] Because of these cohort differences, we decided to change our analytic approach, moving from cohort-specific samples to a multi-cohort sample. Including multiple cohorts in the analyses, helped to account for the idiosyncrasies of each cohort. Overtime, the more cohorts included, the more likely our results will represent a generalizable validity estimate. The current research presents the criterion-related validity analyses for cadets in the F10 through F16 cohorts who were awarded 4R scholarships and enrolled in ROTC. Chapter 5 provides the results of these analyses.

Advanced Camp Data Collection

Since 2010, ARI has been collecting CBEF data at the ROTC Summer Advanced Camp (previously referred to LDAC and Cadet Leadership Course [CLC]) along with several experimental measures. The data were collected for research purposes and allowed us to examine

[5] USACC indicated that due to budget constraints, fewer scholarships were offered to the F12 sample and offers were made later than normal. The validity results for the F12 sample were inconsistent with those of the F11 sample.

the validity of the CBEF composite score against the scores associated with the ROTC commissioning National Order of Merit List (OML) and fourth-year college outcomes such as GPA and APFT. Additionally, we collected data on experimental biodata scales and alternative item formats to evaluate the possibility of including the scales on the four-year scholarship CBEF. This research has shown that there is a positive relationship between several experimental and core CBEF scales and the Outcome Metric Score (OMS) used to rank order cadets on the commissioning OML. During this research effort, USACC has enacted several changes to the ROTC capstone course (Advanced Camp) and the commissioning OML model used to rank cadets for commissioning/branching purposes. The most significant changes were made in 2015 when USACC eliminated the majority of the performance measures that were assessed at Advanced Camp (i.e., LDAC performance, LDAC platoon Tactical evaluation, APFT) and substantially changed the make-up of some core components of the commissioning OML model (e.g., Academic outcomes). Chapter 4 describes the specific changes that were made to the commissioning OML model. Because of these changes, the Advanced Camp analyses in this report focus on the cohorts who attended Advanced Camp in 2015, 2016 and 2017.

Objectives of the Current Project

In May 2015, ARI awarded a three-year contract to the Human Resources Research Organization (HumRRO) to assist with: (a) monitoring and refining the content and scoring of four-year scholarship CBEF; (b) testing and evaluating the CBEF at Advanced Camp; and (c) evaluating the validity evidence of the CBEF for four-year and non-four-year scholarship recipients with pre-commissioning outcomes. This report is intended to serve as a comprehensive repository to the three-year research effort, summarizing the research conducted to evaluate the validity evidence of the CBEF for four-year scholarship recipients. Two memorandums for record (MFR) were produced at the end of each of the first two years of the contract. These MFRs detailed the specific activities conducted during those years (see Appendices A–B). In addition to annually evaluating the criterion-related validity of the CBEF, the following activities also were conducted:

Development of the Multi-Cohort Data File

Over the course of the research effort, we have collected data from eight annual application cycles and eight years of the Advanced Camp. The multi-cohort data file was developed to combine this data into a longitudinal tracking file that easily could be used to address the focal questions associated with this research. The multi-cohort data file includes records of (a) four-year scholarship applicants (e.g., applicants, awardees) and (b) Advanced Camp participants. We have structured the data such that is easy to parse these records into focal research groups, such as those who received a four-year scholarship, have complete application data, and have first-year outcome data (i.e., validation sample). A full summary of the work is provided in Appendix A.

Operational Re-Keying of the Four-Year Scholarship CBEF

As part of the ongoing effort to improve the CBEF, in March of 2015, we undertook analyses to evaluate potential improvements to the scoring of the four-year scholarship CBEF

composite. Based on conversations among the research team, we evaluated a scoring model that included the CBEF Response Distortion as a substantive scale in the composite to determine if it could improve composite's validity for predicting first-year disenrollment among four-year scholarship cadets. Overall, the results of this evaluation suggest that the new CBEF composite (algorithm v2.0) offers value over the original operational composite. Based on these findings, ARI and USACC decided to change the operational scoring of the four-year scholarship CBEF to v2.0. This change went into effect in June of 2015. A full description of the work is summarized in an addendum to this report which can be requested from the authors.

Development of the On-Campus CBEF

USACC requested that ARI develop a new version of the CBEF that could be used to inform the selection of two- and three-year scholarship recipients among cadets who already are enrolled in the ROTC program. We began by evaluating the relationship between CBEF scales and performance outcomes across two- and three-year scholarship recipients, with the primary focus on OML outcomes and GPA. Based on these results, Achievement Orientation and Fitness Motivation consistently were the strongest predictors of OMS, followed by: (a) Stress Tolerance, (b) Peer Leadership, (c) General Self-Efficacy, (d) Hostility to Authority, and (e) Written Communication. These seven scales, along with Response Distortion, were identified for inclusion in the On-Campus CBEF composite. To develop the composite score, we examined several weighting options, including unit weights, regression weights, and a modified regression weighted approach. The composite that showed the best prediction of OMS, while also minimizing the subgroup difference, was a regression-based composite with half the regression weight applied to the Response Distortion and the full regression weight applied to the other seven scales. USACC began preparations to administer the On-Campus CBEF in 2018 and incorporated the CBEF composite scores into the two- and three-year scholarship decisions for the 2019–2020 academic year. A full description of the work is summarized in an addendum to this report which can be requested from the authors.

Organization of the Report

The remaining sections of this report summarize our 2015–2018 effort to (a) monitor and refine the content and scoring of four-year scholarship CBEF data; (b) evaluate the validity evidence of the CBEF for four-year scholarship recipients with pre-commissioning outcomes; and (c) test and evaluate the CBEF at Advanced Camp. Chapter 2 describes the ROTC research sample. Chapters 3 and 4 provide a description of the predictors and criteria used in the four-year scholarship validation analyses. Chapter 5 reports the criterion-related validity evidence of the four-year scholarship CBEF in predicting key outcomes for 4R scholarship recipients in the F10–F16 cohorts. Chapter 6 summarizes the psychometric properties of the Advanced Camp CBEF and the relationship between the Advanced Camp CBEF and OML criteria. Finally, Chapter 7 provides a summary of the research activities conducted across the three-year span of the contract as well as directions for future research.

CHAPTER 2: ROTC COHORTS TESTED ON THE CBEF

Sean Baldwin (HumRRO)

The longitudinal nature of the ROTC research effort requires the identification and tracking of ROTC cohorts over time. In this chapter, we describe the cohorts included in this research effort, including (a) eight cohorts who applied for and received four-year ROTC scholarships and entered college between 2010 and 2017, and (b) three samples of ROTC cadets attending the Advanced Camp course in 2015, 2016, and 2017. After providing a brief overview of the efforts required to maintain the ROTC multi-cohort data file and the information available for each cohort, current as of the 2017 annual data extracts from USACC, we then describe in detail the four-year scholarship and Advanced Camp samples.

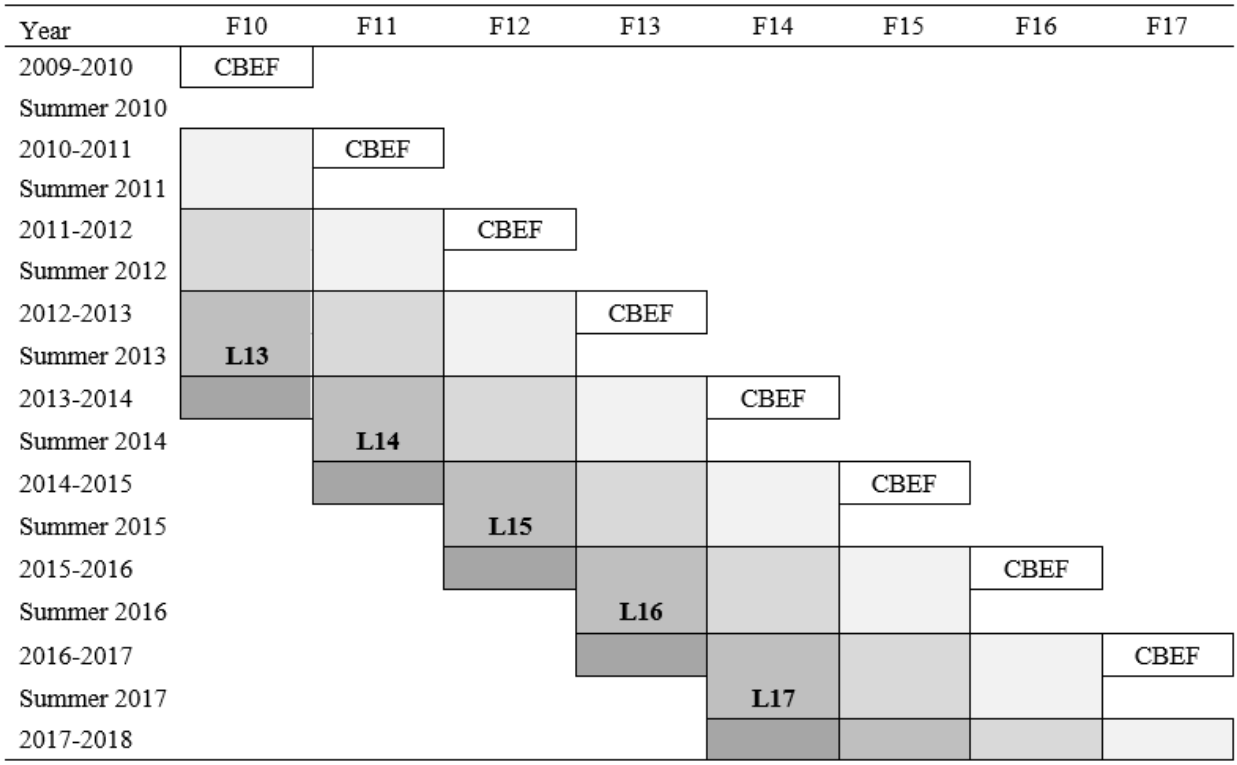
ROTC Longitudinal Research Samples

The ROTC research project is a longitudinal effort by design and includes the administration of the CBEF at different points in time (e.g., four-year scholarship CBEF and Advanced Camp CBEF) as well as the tracking of ROTC outcomes throughout a cadet's ROTC career. Accordingly, we maintain a single file that captures longitudinal and specific information for multiple cohorts (multi-cohort).

Each year, a new four-year scholarship applicant cohort and an Advanced Camp cohort is added to the multi-cohort data file. The four-year scholarship data are provided as data extracts from USACC, whereas the Advanced Camp data are collected in-person by project researchers. Additionally, we receive, from USACC, annual extracts of outcome data, including cumulative GPA, APFT scores, enrollment status, OMS, and OML ranking. Each year, new cadet records and new outcome data corresponding to each cohort's current year in the ROTC program are added to the file. The four-year scholarship applicant cohorts consist of applicants who applied for four-year ROTC scholarships prior to starting their freshman year in 2010 through 2017. Throughout this report, we will refer to these cohorts by their freshman year (e.g., the 2010 freshman year cohort is referred to as F10).

Figure 2.1 presents the data available for each cohort current through 2017. The box denoted as CBEF represents when each cohort applied for four-year scholarships. Each cohort's four years in ROTC are represented with progressively darker shades of grey. The lightest color represents a cohort's first year in ROTC and the darkest color represents a cohorts fourth year. Advanced Camp cohorts are bolded and outlined, occurring in the summer between each cohort's 3rd and 4th year. Notably, the outcome data available for each cohort depends on the maturity of the sample. For example, the 2017 data extract provided fourth year outcome data for the F13 applicant cohort and second year outcome data for the F15 cohort. Figure 2.1 also presents the frequency of cadets who received a four-year scholarship, enrolled in ROTC and had non-missing disenrollment, APFT, or cumulative GPA records for each year. We have strong data coverage for recent cohorts (F14–F16) with sample sizes ranging from 1,687–1,800. Older cohorts (e.g., F11, F13) also show strong sample sizes with regard to outcome data, but additional analyses not reported here show pockets of missing data for some outcome variables in later ROTC year extracts (Year 2–Year 4). F12 notably includes lower sample sizes for all

years and outcome variables, although USACC noted this applicant sample to be an outlier in many respects.[6] F10, the first applicant sample on record, includes the lowest degree of data coverage because the CBEF was only collected during the last four months (November 2009–February 2010) of the application cycle.[7]



	F10	F11	F12	F13	F14	F15	F16	F17
Year 1	699	1,315	942	1,243	1,800	1,713	1,721	-
Year 2	488	1,315	931	1,237	1,798	1,687	-	-
Year 3	445	1,304	935	1,228	1,791	-	-	-
Year 4	690	1,305	934	1,224	-	-	-	-

Figure 2.1. Data extract schedule and frequencies for applicant cohorts.

Note. Each cohort's four years in ROTC are represented with progressively darker shades of grey. Advanced Camp cohorts are bolded and outlined, occurring in the summer between each cohort's 3rd and 4th year. Frequencies denote the number of non-missing disenrollment, APFT, or cumulative GPA records provided by USACC. F10–F17 denote applicant cohorts that began college/ROTC in 2010–2017, respectively. L13–L17 denote Advanced Camp cohorts, attending the course in the summer of 2013–2017, respectively.

[6] USACC indicated that due to budget constraints, fewer scholarships were offered to the F12 sample and offers were made later than normal. The validity results for the F12 sample were inconsistent with those of the F11 sample.

[7] Prior research showed that these cadets looked similar to cadets from other cohorts who applied during similar times of the year.

Four-Year Scholarship Applicant Samples

Annually, USACC provides a raw data extract, including all applicants who applied for four-year scholarships. Then the file is screened to remove anyone who (a) did not complete all the application materials or (b) displayed careless responding on the CBEF.[8] Because the applicant CBEF is an unproctored exam, it is important to screen out unmotivated or careless responders from the analyses. Table 2.1 presents the frequency of screened applicants as well as the frequency of four-year scholarship (4R, 3D, or QE) winners and non-scholarship winners. Across years, the frequency of applicants generally has stayed the same over time. The proportional make-up of the four-year scholarship winners has changed notably over time with 4R scholars composing less of the sample each year. The F10 applicant sample consisted of proportionally more 4R than 3D awardees (38% and 8%, respectively), whereas the F16 applicant sample included the opposite pattern (15% and 23%, respectively). This change is primarily due to the increased number of 3D awards, with the number of 4R awards staying relatively constant over time. Exceedingly few QE awardees are in the applicant samples between F10–F13 with none composing later applicant samples (F14–F16). The process for awarding scholarships is quite selective, with most applicants receiving no scholarship or non-four-year scholarships for each applicant cohort (54–80%).

Table 2.1 also presents the demographics of the four-year scholarship applicant samples. The demographics of the applicant samples have remained quite stable over time. The applicant samples are mostly male (71%–76%) and white (74%–78%). Other racial categories consistently make-up a far smaller portion of the applicant sample, ranging from less than one percent (American Indian) to 14 percent (African American). Ethnicity data were not provided by USACC for the F16 cohort, however; the consistency of the other cohorts' ethnic make-up over time suggests that this cohort would exhibit similar demographic patterns.

[8] Records are flagged for poor response patterns if they meet any of the following criteria: (a) >10% missingness, (b) any one response option is used for more than 66% of all responses, (c) >47% of side-by-side responses are identical, (d) >10% of all possible ten-item runs are responded to identically, (e) a Mahalanobis Distance statistic > 300 (Mahalanobis, 1936).

Table 2.1. Four-Year Scholarship Applicant Sample Demographics

	F10		F11		F12		F13		F14		F15		F16[a]	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Applicants	1,499	-	4,644	-	4,635	-	4,759	-	4,298	-	4,129	-	4,598	-
Gender														
Female	336	22	958	21	1,013	22	1,002	21	937	22	970	23	1,124	24
Male	1,160	77	3,658	79	3,622	78	3,757	79	3,361	78	3,158	76	3,472	76
Other	3	0	28	1	0	0	0	0	0	0	1	0	2	0
Ethnicity														
Hispanic	143	10	396	9	412	9	450	9	396	9	455	11	-	-
Non-Hispanic	1,356	90	4,248	91	4,223	91	4,309	91	4,902	91	3,674	89	-	-
Race														
African American	125	8	333	7	372	8	349	7	336	8	322	8	-	-
American Indian	39	3	132	3	111	2	121	3	118	3	51	1	-	-
Asian/Pacific Islander	145	10	371	8	342	7	403	8	366	9	311	8	-	-
Hispanic	143	10	396	9	412	9	450	9	396	9	455	11	-	-
White	1,199	80	3,909	84	3,917	85	3,988	84	3,538	82	3,442	83	-	-
Other	30	2	103	2	76	2	83	2	70	2	5	0	-	-
Missing	91	6	185	4	169	4	201	4	190	4	253	6	-	-
Scholarship Award														
3D	119	8	317	7	197	4	467	10	904	21	870	21	1,044	23
4R	567	38	993	21	744	16	773	16	902	21	858	21	708	15
QE	11	1	5	0	1	0	4	0	0	0	0	0	0	0
Other or no scholarship	802	54	3,329	72	3,693	80	3,515	74	2,492	58	2,401	58	2,846	62

Note. Applicants denote applicants that had complete CBEF and WPS data, participated in the interview process, and were rated by a board of Professors of Military Science (PMS). Percentages of the applicant sample are presented. Ethnicity was self-report and allowed multiple responses; therefore, ethnicity percentages are not expected to sum to 100.

[a] Ethnicity data were not provided by USACC for the F16 cohort.

4R Scholarship Sample

We have had significant discussion regarding what sample is most appropriate for use in CBEF model development and evaluation with respect to predicting ROTC continuance outcomes. As noted in the previous section, there are two primary four-year scholarship categories which receive somewhat different educational benefits (there are typically only a few cases each year in the QE category; therefore, they are not discussed in this chapter). Specifically, the 4R awardees receive funding during their freshman year, while 3D awardees do not begin to receive funding until their second year in the ROTC program. Not surprisingly, we observe that these differing scholarship policies are related to cadet separation rates. Those who receive funding throughout the entire four years of ROTC have lower withdrawal rates and are considered to be the most competitive and desirable by USACC. We view the different scholarship benefits across the 4R and 3D categories as a confounding variable that obfuscates the interpretation of results when these groups are combined for analyses pertaining to the prediction of continuance/ withdrawal behavior. This view is supported by analyses showing that the WPS was unrelated to ROTC disenrollment when examined separately for 4R and 3D scholarship subgroups. However, the WPS significantly predicted disenrollment when the two scholarship types were combined into a single sample. We believe this finding is confounded by the different funding policies across groups. Therefore, our analyses focus on the 4R scholarship sample.[9]

Table 2.2 provides the demographics for the 4R scholarship recipients who enrolled in ROTC and had non-missing disenrollment, APFT, or cumulative GPA record (i.e., the validation sample). The size of the 4R scholarship validation sample varies by year, in part due to the fluctuating needs of the Army. Much like the full applicant sample, the 4R scholarship validation sample is mostly composed of males (79–82%). Whites make up most of the sample (84–91%), with other races and ethnicities less represented (3–5% African American and 10% Hispanic).

[9] We also have considered the possibility of developing separate models for each scholarship category. However, this option is not a feasible because the scholarship category status can be determined only *after* selection has taken place.

Table 2.2. 4R Scholarship Validation Sample Demographics

	F10		F11		F12		F13		F14		F15		F16[a]	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
4R Awardees	601	-	1,014	-	770	-	811	-	909	-	863	-	714	-
Gender														
Female	125	21	205	20	135	18	165	20	160	18	166	19	134	19
Male	475	79	808	80	635	82	646	80	749	82	697	81	580	81
Other	1	0	1	0	-	-	-	-	-	-	-	-	-	-
Ethnicity														
Hispanic	55	9	70	7	67	9	78	10	74	8	53	6	-	-
Non-Hispanic	546	91	944	93	703	91	733	90	835	92	810	94	-	-
Race														
African American	29	5	38	4	29	4	30	4	25	3	28	3	-	-
American Indian	18	3	18	2	15	2	18	2	18	2	14	2	-	-
Asian/Pacific Islander	52	9	48	5	46	6	55	7	69	8	57	7	-	-
Hispanic	55	9	70	7	67	9	78	10	74	8	53	6	-	-
White	507	84	926	91	691	90	712	88	797	88	763	88	-	-
Other	9	1	28	3	10	1	15	2	17	2	2	0	-	-
Missing	31	5	19	2	24	3	24	3	35	4	50	6	-	-

Note. 4R Awardees include those who receive a 4R scholarship, enrolled in ROTC and had non-missing disenrollment, APFT, or cumulative GPA record. Ethnicity was self-report and allowed multiple responses; therefore, ethnicity percentages are not expected to sum to 100.

[a] Ethnicity data were not provided by USACC for the F16 cohort.

Advanced Camp Samples

ROTC cadets attend a leadership course during the summer of their third collegiate year. This course has been referred to by several previous names (e.g., LDAC, CLC), and is currently referred to as Advanced Camp. The leadership course currently is held at Fort Knox (Kentucky) and lasts four weeks. During this period, cadets take on various leadership roles and are evaluated on their performance and leadership abilities. The results of these many evaluations culminate to a single weighted composite score (i.e., OMS), which is used to rank-order cadets on the commissioning OML and determine commissioning status and branching. Accordingly, Advanced Camp is a critical point in cadets' progression through the ROTC program. During the first few days of Advanced Camp, cadets are asked to take the Advanced Camp CBEF voluntarily. Unlike the High School CBEF which is administered to four-year ROTC scholarship applicants via computer, the Advanced Camp CBEF is administered via paper-and-pencil. In addition, Advanced Camp participants are informed that their test scores will only be used for research purposes, and that participation in the research will have no impact upon their careers in ROTC or the Army.

Table 2.3 presents the demographics of the 2015–2017 Advanced Camp cohorts.[10] Results show a slight decrease in the size of each cohort between 2015 (n = 5,548) and 2017 (n = 4,719). The demographic make-up of Advanced Camp cohorts is consistent, primarily consisting of males (76%–79%). Whites make up most of the sample (65%–69%), with African American and Hispanic cadets made up 10% to 11% and 9% to 10% of the samples, respectively. Other racial categories were less prevalent, making up less than 10% across all Advanced Camp cohorts.

Eleven percent to 13% of the Advanced Camp cohorts were 4R scholarship recipients. Like the pattern observed for the applicant cohorts, the frequency of 3D awardees in the Advanced Camp cohorts is notably higher in the 2017 cohort (10%) in comparison to previous cohorts (2–4%). The majority of each Advanced Camp cohort was not awarded a four-year scholarship (77–87%).

[10] These frequencies represent the number of cadets participating in the CBEF data collection during a given Advanced Camp year and may not represent the total number of cadets at Advanced Camp (i.e., some may have declined to participate).

Table 2.3. Advanced Camp Sample Demographics

	2015		2016		2017	
	n	*%*	*n*	*%*	*n*	*%*
Full Sample	5,548	-	5,317	-	4,719	-
Gender						
Female	1,190	21	1,220	23	1,124	24
Male	4,356	79	4,089	77	3,578	76
Other	2	0	8	0	17	0
Ethnicity						
Hispanic	537	10	483	9	494	10
Non-Hispanic	5,011	90	4,464	84	4,225	90
Race						
Black	611	11	537	10	496	11
Hispanic	537	10	483	9	494	10
American Indian	9	0	8	0	45	1
White	3,823	69	3,433	65	3,107	66
Asian/Pacific Islander	335	6	277	5	336	7
Other	233	4	209	4	137	3
Missing	-	-	-	-	104	2
Scholarship Award						
3D	98	2	220	4	486	10
4R	611	11	562	11	593	13
QE	1	0	2	0	-	-
Other or no scholarship	4,838	87	4,533	85	3,640	77

Note. The *Full Sample* denotes the number of Cadets who volunteered to participate in the in-person Advanced Camp data collections and passed the ROTC Longitudinal Research response screens.

CHAPTER 3: EVALUATING THE PSYCHOMETRIC PROPERTIES OF PREDICTORS

Kerrin E. Puente and Jennifer P. Green (HumRRO)

This chapter describes basic psychometric properties of the CBEF used in the four-year ROTC scholarship application. Previous research has examined the functioning of the CBEF under operational conditions and compared it to the CBEF administered in research settings (cf. Bynum & Legree, 2014). The current analyses extend this previous research by describing how the CBEF composite and scales continue to function under high stakes, operational conditions across a pooled sample of four-year scholarship applicants for F10–F16. We also describe the WPS and how it has changed over time.

Method

Four-Year Scholarship Applicant Sample

The four-year scholarship applicant sample included cadets who had (a) complete CBEF and WPS data, (b) displayed effortful responding on the CBEF, and (c) participated in the interview process and were rated by a board of Professors of Military Science (PMS). Analyses were conducted using the pooled F10–F16 samples to observe patterns of results across cohorts. As a reminder, F10, the first applicant sample on record, includes the lowest degree of data coverage because the CBEF was only collected from a subset of the applicant sample for that year. CBEF data for the F10 cohort was only collected for 4 months of the 12-month application cycle, November 2009–February 2010. Results for the 4R validation sample and all four-year scholarship recipients (4R, 3D, and QE) are presented in Appendix B.

Predictors

As described in Chapter 1, USACC uses the WPS, which includes the CBEF, to award four-year scholarships. Over time, several changes were made to the scholarship process (See Chapter 1 for more details). Most relevant to the current analyses, two additional components (i.e., PFA and the CBEF) were added to the WPS in 2012 and the scoring algorithm for the operational CBEF was updated in 2015 (CBEF composite v2.0). As such, the discussion in this chapter focuses on the following predictors:

Historical WPS: The WPS used prior to 2012 reflected four components: (a) SAT/ACT scores; (b) Scholar-Athlete-Leader scores, which reflect ROTC's desire for Cadets who excel at academics, are athletic, and serve in leadership positions; (c) PMS interview scores; and (d) promotion board scores. When computing the historical WPS for operational use, USACC rescaled all components and allotted a maximum amount of points as summarized in Table 3.1. The maximum total WPS an applicant could receive was 1,000 points.

Current WPS: Starting with F12 sample, PFA[11] scores and the CBEF were added to the other WPS components. Both components were rescaled and allotted a maximum amount of

[11] The Physical Fitness Assessment consists of 1-minute of pushups, 1-minute of curl-ups, and a 1-mile run.

points increasing the maximum total WPS an applicant could receive up to 1,400 points. Table 3.1 summarizes the updates to the scales and points allocation for the WPS.

For the purposes of our analyses, we computed a WPS that did not include the CBEF scores. This analysis allowed us to compare the validity of the WPS components to the CBEF score. Because the PFA was not given to applicants prior to the F12 application year, analyses including the WPS and WPS plus CBEF were limited to the F12–F16 cohorts.

Table 3.1. Comparison of WPS Models

WPS components	Version	
	Historical WPS (F10–F11)	Current WPS (F12–F16)
Scholar-Athlete-Leader Points	200	200
Board Points	350	350
SAT/ACT Points	250	250
PMS Interview Score Points	200	200
Physical Fitness Assessment Points	-	150
CBEF	-	250
Total	1,000	1,400

Response Distortion Adjustment: Items assessing personal characteristics of applicants (e.g., personality, attitudes, values, beliefs, experiences), rather than the respondents' knowledge of a given topic (e.g., military protocols) are thought to be susceptible to response distortion. That is, applicants may provide responses that make themselves look more desirable. To the extent that response distortion can affect applicants' responses in a way that would not account for the applicants' actual experiences, beliefs, values, etc., response distortion is a source of bias in the assessment (Cronbach, 1946; Edwards, 1957). These concerns are even more prevalent for assessments that are used for high-stakes decisions, in which the benefits are quite notable for applicants who can *fake* their way to looking like a more desirable applicant.

The four-year scholarship CBEF, which is both a biographical data measure and one used for high-stakes selection purposes, is susceptible to response distortion. Therefore, efforts were taken to minimize these effects. The Response Distortion scale is administered to identify socially desirable responders. These items offer extreme response options that truthful applicants would not endorse. A statistical adjustment is applied to each of the CBEF scales of applicants who endorse these extreme responses to remove the variance associated with social desirability. In the remainder of this report, we refer to the original scales by their CBEF scale name, whereas adjusted scales are referred to as the scale name preceded by "RD-adjusted." The experimental scales were not adjusted for response distortion.

CBEF Composite v1.0: The original CBEF consists of a set of rationally-keyed biodata scales designed to assess temperament constructs hypothesized to relate to cadet and officer retention. CBEF v1.0 includes five scales: (1) RD-adjusted Army Identification (Attachment & Decision to Join), (2) RD-adjusted Achievement, (3) RD-adjusted Fitness Motivation, (4) RD-adjusted Hostility to Authority, and (5) RD-adjusted Stress Tolerance. CBEF scales are RD-adjusted by adjusting for the proportion of the Response Distortion items that were endorsed.

CBEF Composite v2.0: A new scoring algorithm for the CBEF composite was implemented in June 2015 for applicants applying for four-year scholarship for the 2016–2017 academic year (F16 cohort). CBEF v2.0 includes the five scales included on the CBEF v1.0 plus the Response Distortion scale. For details on the development of the new scoring algorithm, please contact the report authors.

Experimental CBEF Scales: In addition to the core CBEF scales that are used to construct the composite scores, several experimental scales also were administered to applicants. Updates regularly are made to the experimental scales included on the CBEF. Table 3.2 shows the experimental scales that were administered to each applicant cohort. Recall that the experimental scales were not adjusted for response distortion.

Table 3.2. Experimental CBEF Scales by Cohort

	F10	F11	F12, F13, F14	F15	F16
Experimental CBEF Biodata Scales					
Coachability			X		
Equity Sensitivity			X		
General Self-Efficacy	X	X	X	X	X
Goal Orientation-Continuance				X	X
Hostility to Authority-Maturity		X	X	X	X
Instrumentality of ROTC Funding	X	X			
Instrumentality of Army to Career Goals	X	X			
Interest in Leadership		X	X	X	
Manipulativeness	X	X			
Past Withdrawal Propensity	X	X		X	X
Peer Leadership		X	X	X	X
Tolerance for Injury	X	X		X	X
Written Communication					X

Results

Descriptive Statistics, Reliability, and Intercorrelations

Descriptive statistics, composite reliability (cf. Mosier, 1943), and scale internal consistency (i.e., coefficient alpha, Kuder-Richardson) reliabilities for the four-year scholarship applicant sample and the 4R validation sample appear in Table 3.3. CBEF v1.0 demonstrated acceptable reliability (*rxx/ryy* = .87). In comparison, the reliability of CBEF v2.0 (*rxx/ryy* = .67) was lower than generally accepted standards of .70. The low reliability appears to be attributable to the weights rather than the covariance of the Lie-scale.

The core CBEF scales showed acceptable variance and reliability. An exception was Hostility to Authority, which showed particularly low internal consistency ($\alpha = .57$). However, this finding may be attributable, in part, to the number of items in the scale ($k = 4$), as the relationship between scale length and coefficient alpha has long been documented (Cortina, 1993). Among the experimental CBEF scales, the internal consistency for the four-item Goal Orientation scale was also quite low ($\alpha = .58$). The reliability results for the 4R validation sample

closely resembles the results for the four-year applicant sample. Of note, the sample size reported for the experimental scales will vary because of changes to the CBEF over time. For descriptive statistics by cohort, refer to Appendix B.

Table 3.3 provides the mean differences between all applicants and the 4R validation sample. Differences between samples are presented as Cohen's *d* effect sizes (Cohen, 1988). Cohen *d* reflects the mean difference in scores on a given measure (e.g., the CBEF) across subgroups (e.g., all applicants, 4R validation sample) and is expressed in standard deviation units. Cohen suggested that *d*'s of .20 in magnitude represent a small difference between groups, .50 a moderate difference, and .80 a large difference. The formula for Cohen's *d* is:

$$d = (M_{\text{Referent group}} - M_{\text{Non-referent group}})/\text{Pooled } SD$$

where the "referent group" is all four-year scholarship applicants.

As expected, those who accepted 4R scholarships had higher CBEF and WPS scores than the full applicant sample. CBEF differences were generally small (*d* = -.29 to -.19); whereas, differences on WPS composite scores were large (*d* = -.80 to -.67). Despite this finding, the 4R scholarship validation sample exhibited a similar relative standard deviation, or coefficient of variation, on CBEF and WPS composite scores (coefficient of variation = 13% to 29%) compared to the four-year applicant sample (coefficient of variation = 8% to 26%). The ratios of CBEF standard deviations from the 4R scholarship sample to those from the four-year applicant sample were high (.94 for CBEF v1.0 and .95 for CBEF v2.0). However, the ratios of WPS composite score standard deviations from the 4R sample to those from the four-year applicant sample were lower by comparison (.64 for current WPS, .62 for WPS plus CBEF v1.0, and .64 for WPS plus CBEF v2.0). Thus, there may be some range restriction on WPS composite scores in the 4R scholarship validation sample.

Table 3.4 shows correlations among the predictor scales. On average, the core CBEF scales were: (a) minimally correlated with each other (*Min r* = -.26, *Max r* = .27) and (b) minimally to moderately correlated with the experimental CBEF scales (*Min r* = -.39, *Max r* = .55). The pattern of correlations generally was consistent with a priori expectations. The strongest correlations among the core CBEF scales were observed between Stress Tolerance and Fitness Motivation (*r* = .27) and between Achievement Orientation and Hostility to Authority (*r* = -.26). Among all CBEF scales, the largest correlation was seen between Interest in Leadership and Peer Leadership (*r* = .66).

In addition to examining relationships among CBEF scales, we also examined their relationship to WPS. Recall, that the WPS plays a key role in awarding scholarships. Thus, it is important to examine the relationship between CBEF scales and WPS to determine potential redundancy of the CBEF scales. If CBEF scales are redundant with WPS, their utility for complementing WPS as a potential predictor of disenrollment would be limited. As shown in Table 3.4, there was minimal overlap between the CBEF composite scores and (a) the historical WPS (*Min r* = .06, *Max r* = .12), (b) the current WPS (*Min r* = .08, *Max r* =.16), and (c) WPS components (*Min r* = .03, *Max r* =.20). Athlete Points and PFA scores were moderately correlated with Fitness Motivation scores (*r* = .38 and .57, respectively), but scores between WPS components and core CBEF scales were otherwise small.

Table 3.3. Descriptive Statistics for Four-Year Scholarship Applicants from F10–F16

	Applicant Sample					4R Validation Sample					All - 4R
	k	*rxx*	*n*	*M*	*SD*	*k*	*rxx/ryy*	*n*	*M*	*SD*	*d*
CBEF Composite Score											
CBEF v1.0	5	.87	28,562	131.90	38.51	5	.86	5,545	143.12	36.20	-.29
CBEF v2.0	6	.67	28,562	129.05	37.80	6	.66	5,545	136.16	35.91	-.19
Whole Person Score (WPS)											
Historical WPS without CBEF			21,978	656.67	107.33			4,973	725.49	77.17	-.67
Historical WPS + CBEF v1.0			21,940	790.11	117.48			4,971	869.11	84.72	-.70
WPS without CBEF			17,450	793.91	116.77			3,654	879.67	75.03	-.77
WPS + CBEF v1.0			17,435	928.60	127.99			3,654	1026.71	79.92	-.81
WPS + CBEF v2.0			17,387	925.65	124.85			3,649	1019.78	80.01	-.80
WPS Components											
Athlete Points			28,562	32.83	14.01			5,545	37.70	11.66	-.36
Board Points			28,562	206.01	57.27			5,545	246.75	44.87	-.73
Scholar Points			28,562	21.21	11.56			5,545	24.67	10.56	-.30
Leader Points			28,562	32.45	12.47			5,545	36.41	10.63	-.33
SAT/ACT			28,562	163.76	32.68			5,545	180.38	29.18	-.52
PMS Interview Score			28,562	173.08	32.80			5,545	190.83	16.60	-.58
Physical Fitness Assessment			22,404	126.46	24.64			3,985	136.75	15.72	-.44
Core CBEF Biodata Scales [a]											
Achievement Orientation (RD-adjusted)	9	.75	28,562	4.25	.38	9	.72	5,545	4.36	.34	-.30
Army Identification (RD-adjusted)	11	.85	28,562	4.12	.47	11	.85	5,545	4.18	.46	-.14
Fitness Motivation (RD-adjusted)	8	.82	28,562	3.88	.58	8	.79	5,545	4.04	.53	-.27
Hostility to Authority (RD-adjusted) [b]	4	.57	28,562	1.51	.35	4	.56	5,545	1.47	.34	.11
Stress Tolerance (RD-adjusted)	10	.70	28,562	3.40	.38	10	.68	5,545	3.46	.37	-.14
Response Distortion [a]	7	.76	28,562	.09	.16	7	.74	5,545	.08	.14	.11

(continued)

Table 3.3. (Continued)

	Applicant Sample					4R Validation Sample					All - 4R
	k	*rxx*	*n*	*M*	*SD*	*k*	*rxx/ryy*	*n*	*M*	*SD*	*d*
Experimental CBEF Biodata Scales [a]											
Coachability	5	.70	13,712	3.95	.57	5	.69	2,425	3.97	.55	-.03
Equity Sensitivity	9	.70	13,691	2.36	.48	9	.70	2,419	2.32	.47	.09
Goal Orientation	4	.58	8,728	4.39	.48	4	.58	1,566	4.41	.47	-.05
Instrumentality of ROTC Funding	2	.68	6,143	3.87	.85	2	.67	1,560	3.79	.86	.10
Instrumentality of Army to Career Goals	4	.66	6,143	2.95	.70	4	.67	1,560	2.9	.69	.06
Interest in Leadership	6	.80	17,820	4.12	.55	6	.78	3,277	4.23	.51	-.21
Manipulativeness [a]	7	.66	6,143	2.25	.42	7	.68	1,560	2.25	.42	.01
Peer Leadership	6	.81	22,419	3.94	.57	6	.80	3,985	4.06	.53	-.20
Past Withdrawal Propensity [b]	8	.64	14,870	1.79	.42	8	.62	3,126	1.76	.40	.08
Self-Efficacy	6	.79	28,561	4.38	.39	6	.77	5,545	4.43	.37	-.13
Tolerance for Injury	5	.67	14,870	3.66	.63	5	.67	3,126	3.71	.61	-.08
Written Communication	7	.74	4,598	3.51	.54	7	.72	708	3.61	.50	-.19

Note. *k* = number of items/scales in the composite. *ryy/rxx* = reliability coefficient. Scales listed as *RD-adjusted* are corrected using the Response Distortion scale. All other scales are based on the raw response values.

[a] None of the experimental scales were adjusted for response distortion.

[b] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table 3.4. Sample Correlations Among WPS and CBEF Scales for Four-Year Scholarship Applicants from F10–F16

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. CBEF v1.0	1.00															
2. CBEF v2.0	**.52**	1.00														
3. Historical WPS without CBEF	**.12**	**.06**	1.00													
4. Historical WPS + CBEF v1.0	**.41**	**.24**	**.95**	1.00												
5. WPS without CBEF	**.16**	**.08**	**.98**	**.94**	1.00											
6. WPS + CBEF v1.0	**.43**	**.22**	**.93**	**.98**	**.96**	1.00										
7. WPS + CBEF v2.0	**.30**	**.36**	**.94**	**.95**	**.96**	**.96**	1.00									
8. Athlete Points	**.14**	**.03**	**.37**	**.37**	**.40**	**.40**	**.38**	1.00								
9. Board Points	**.13**	**.07**	**.95**	**.89**	**.93**	**.88**	**.89**	**.33**	1.00							
10. Scholar Points	**.07**	**.07**	**.37**	**.35**	**.34**	**.33**	**.34**	**.09**	**.32**	1.00						
11. Leader Points	**.14**	**.06**	**.34**	**.34**	**.34**	**.35**	**.33**	**.30**	**.29**	**.44**	1.00					
12. SAT/ACT	**.05**	**.04**	**.75**	**.69**	**.72**	**.67**	**.68**	**.06**	**.66**	**.23**	**.09**	1.00				
13. PMS Interview	**.16**	**.09**	**.72**	**.70**	**.71**	**.69**	**.68**	**.41**	**.65**	**.24**	**.35**	**.29**	1.00			
14. Physical Fitness Assessment	**.20**	**.09**	**.29**	**.32**	**.47**	**.48**	**.46**	**.36**	**.32**	**.03**	**.14**	**.14**	**.26**	1.00		
15. Achievement Orientation (RD-adjusted)	**.59**	**.25**	**.28**	**.42**	**.27**	**.41**	**.32**	**.12**	**.28**	**.19**	**.18**	**.19**	**.25**	**.03**	1.00	
16. Army Identification (RD-adjusted)	**.81**	**.56**	**-.04**	**.20**	**-.02**	**.22**	**.14**	**.01**	**-.04**	**.03**	**.09**	**-.06**	**.04**	**.10**	**.21**	1.00
17. Fitness Motivation (RD-adjusted)	**.47**	**.15**	**.16**	**.28**	**.26**	**.37**	**.28**	**.38**	**.16**	**-.09**	**.08**	**.02**	**.19**	**.57**	**.16**	**.25**
18. Hostility to Authority (RD-adjusted) [a]	**-.34**	**-.62**	**-.05**	**-.17**	**-.04**	**-.13**	**-.21**	.01	**-.07**	**-.09**	**-.04**	**-.02**	**-.05**	**.02**	**-.26**	**-.11**
19. Stress Tolerance (RD-adjusted)	**.55**	**-.04**	**.06**	**.20**	**.08**	**.23**	**.06**	**.08**	**.04**	**-.03**	**.02**	**.05**	**.03**	**.10**	**.16**	**.20**
20. Response Distortion [a]	**.02**	**-.49**	**-.10**	**-.11**	**-.11**	**-.09**	**-.24**	-.01	**-.09**	.00	**.03**	**-.15**	**-.04**	**-.03**	**-.02**	**.03**
21. Coachability	**.19**	**.02**	.00	**.05**	-.01	**.04**	.00	-.01	.01	**.07**	**.04**	-.01	.01	**-.05**	**.29**	**.10**
22. Equity Sensitivity	**-.37**	.01	**-.05**	**-.16**	**-.05**	**-.15**	**-.04**	-.01	**-.04**	**-.06**	**-.07**	**-.03**	**-.04**	-.01	**-.18**	**-.24**
23. Goal Orientation	**.58**	**.29**	**-.07**	**.08**	**-.05**	**.13**	**.04**	.00	**-.07**	**.04**	**.07**	**-.11**	.01	**.05**	**.21**	**.64**
24. Instrumentality of ROTC Funding	**-.07**	**-.07**	**-.21**	**-.21**	-	-	-	**-.10**	**-.17**	**.03**	.02	**-.21**	**-.12**	-	**.06**	**-.10**
25. Instrumentality of Army to Career Goals	**.32**	**.21**	**-.15**	-.02	-	-	-	-.02	**-.13**	-.02	**.04**	**-.16**	**-.07**	-	**-.07**	**.48**
26. Interest in Leadership	**.44**	**.05**	**.12**	**.25**	**.13**	**.24**	**.14**	**.12**	**.12**	**.07**	**.21**	**.04**	**.17**	**.08**	**.38**	**.30**
27. Manipulativeness [a]	**-.27**	**.04**	**-.03**	**-.12**	-	-	-	-.01	-.02	**-.03**	**-.03**	.00	**-.03**	-	**-.16**	**-.11**
28. Peer Leadership	**.43**	**.02**	**.12**	**.22**	**.11**	**.22**	**.12**	**.08**	**.13**	**.14**	**.27**	**.03**	**.17**	**.02**	**.44**	**.28**
29. Past Withdrawal Propensity [a]	**-.40**	**-.07**	**-.10**	**-.19**	**-.08**	**-.18**	**-.09**	**-.19**	**-.10**	**-.04**	**-.10**	.00	**-.11**	**-.10**	**-.27**	**-.23**
30. Self-Efficacy	**.55**	**.02**	**.05**	**.19**	**.06**	**.21**	**.06**	**.09**	**.05**	**.04**	**.11**	**-.02**	**.10**	**.05**	**.49**	**.33**
31. Tolerance for Injury	**.35**	**.08**	**-.05**	**.04**	-.02	**.08**	.00	**.13**	**-.04**	**-.12**	.01	**-.05**	**.04**	**.10**	**.05**	**.36**
32. Written Communication	**.34**	-.01	**.16**	**.15**	**.15**	**.23**	**.14**	**.03**	**.17**	**.18**	**.17**	**.14**	**.13**	-.01	**.41**	**.18**

(continued)

Table 3.4. (Continued)

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1. CBEF v1.0																
2. CBEF v2.0																
3. Historical WPS without CBEF																
4. Historical WPS + CBEF v1.0																
5. WPS without CBEF																
6. WPS + CBEF v1.0																
7. WPS + CBEF v2.0																
8. Athlete Points																
9. Board Points																
10. Scholar Points																
11. Leader Points																
12. SAT/ACT																
13. PMS Interview																
14. Physical Fitness Assessment																
15. Achievement Orientation (RD-adjusted)																
16. Army Identification (RD-adjusted)																
17. Fitness Motivation (RD-adjusted)	1.00															
18. Hostility to Authority (RD-adjusted) [a]	-.01	1.00														
19. Stress Tolerance (RD-adjusted)	**.27**	**-.21**	1.00													
20. Response Distortion [a]	**.06**	**-.02**	**-.01**	1.00												
21. Coachability	.00	**-.08**	**.04**	**.13**	1.00											
22. Equity Sensitivity	**-.14**	**.21**	**-.36**	**-.31**	**-.14**	1.00										
23. Goal Orientation	**.21**	**-.14**	**.19**	**.22**	-	-	1.00									
24. Instrumentality of ROTC Funding	**-.09**	-.01	**-.07**	**.06**	-	-	-	1.00								
25. Instrumentality of Army to Career Goals	**.14**	**-.03**	**.08**	**.14**	-	-	-	**.04**	1.00							
26. Interest in Leadership	**.25**	**-.07**	**.20**	**.22**	**.14**	**-.24**	**.32**	-	-	1.00						
27. Manipulativeness [a]	**-.07**	**.27**	**-.31**	**-.39**	-	-	-	**.07**	**-.05**	-	1.00					
28. Peer Leadership	**.21**	**-.08**	**.17**	**.27**	**.20**	**-.29**	**.30**	-	-	**.66**	-	1.00				
29. Past Withdrawal Propensity [a]	**-.24**	**.24**	**-.29**	**-.28**	-	-	**-.27**	**.03**	**-.16**	**-.31**	**.39**	**-.27**	1.00			
30. Self-Efficacy	**.32**	**-.16**	**.31**	**.37**	**.20**	**-.35**	**.41**	**.08**	**.10**	**.50**	**-.28**	**.52**	**-.41**	1.00		
31. Tolerance for Injury	**.34**	**.08**	**.18**	**.10**	-	.[a]	**.26**	**-.04**	**.25**	**.19**	.00	**.16**	**-.19**	**.26**	1.00	
32. Written Communication	**.10**	**-.12**	**.17**	**.26**	-	-	**.18**	-	-	-	-	**.49**	**-.20**	**.38**	**.07**	1.00

Note. WPS = Whole person Score. CBEF = Cadet background and experiences form composite. APFT = Army Physical Fitness Test. GPA = Grade point average. Dashes indicate data were not available. n = 3,610–28,562. Bolded values indicate significance at $p < .05$ (two-tailed). Results based on sample sizes less than 250 are not presented. Experimental scales were not adjusted for response distortion.

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Subgroup Differences

When evaluating high-stakes assessments, it is important to consider whether assessment scores exhibit mean differences across subgroups (e.g., female versus male, Black versus White). To the extent that sizable differences exist, the measure may be perceived as unfair or result in decisions that systematically disadvantage particular groups. Thus, we examined the possibility of subgroup differences in the four-year applicant sample on the CBEF and WPS. In the sections below, subgroup differences are presented as Cohen's *d* effect sizes (Cohen, 1988), where the "referent group" is males for gender comparisons and whites for racial/ethnic comparisons.

Gender Differences

Descriptive statistics and Cohen's *d* effect sizes for gender comparisons appear in Table 3.5. As shown, effect sizes for gender differences in the predictors ranged from -0.41 to 0.94. Importantly, the difference in CBEF v2.0 scores between males and females is very small based on Cohen's benchmarks ($d = 0.09$). This difference was smaller than that observed for CBEF v1.0 ($d = 0.28$). Large gender differences in scores were observed for (a) the PFA ($d = 0.94$) and (b) Fitness Motivation ($d = 0 .90$), with higher scores for males. These scales are the likely drivers of the significant mean differences observed for both CBEF v1.0 and CBEF v2.0, as well as WPS composites. Among the other core CBEF scales, gender differences were observed for (a) Army Identification, Hostility to Authority, and Stress Tolerance (with higher scores for males), and (b) Achievement Orientation and Response Distortion (with higher scores for females). Small or near zero gender differences were observed for the remaining WPS components.

Among the experimental CBEF scales, females tended to have higher scores on Coachability, Instrumentality of ROTC Funding, Peer Leadership, Self-Efficacy, and Written Communication; whereas, males tended to have higher scores on Equity Sensitivity, Goal Orientation, Instrumentality of Army to Career Goals, Manipulativeness, Past Withdrawal Propensity, and Tolerance for Injury. Since Response Distortion, Hostility to Authority, Manipulativeness, and Past Withdrawal Propensity are negatively valanced, *lower* scores are considered better scores.

Table 3.5. Descriptive Statistics for Gender Comparisons Among Four-Year Scholarship Applicants from F10–F16

	Male			Female			M vs F
	n	*M*	*SD*	*n*	*M*	*SD*	*d*
CBEF Composite Score							
CBEF v1.0	22,188	134.27	38.17	6,340	123.62	38.58	**.28**
CBEF v2.0	22,188	129.85	37.47	6,340	126.28	38.80	**.09**
Whole Person Score (WPS)							
Historical WPS without CBEF	16,864	658.13	106.82	5,088	652.25	108.77	**.05**
Historical WPS + CBEF v1.0	16,842	793.88	116.75	5,072	778.01	118.99	**.14**
WPS without CBEF	13,324	800.43	113.60	4,123	772.77	124.12	**.24**
WPS + CBEF v1.0	13,319	937.68	124.51	4,113	899.13	134.53	**.30**
WPS + CBEF v2.0	13,287	932.99	121.35	4,097	901.77	132.81	**.25**
WPS Components							
Athlete Points	22,188	33.00	13.79	6,340	32.24	14.75	**.05**
Board Points	22,188	205.97	57.16	6,340	206.32	57.64	-.01
Scholar Points	22,188	20.79	11.73	6,340	22.73	10.81	**-.17**
Leader Points	22,188	32.16	12.63	6,340	33.50	11.82	**-.11**
SAT/ACT	22,188	165.39	32.34	6,340	158.14	33.22	**.22**
PMS Interview Score	22,188	172.15	33.21	6,340	176.41	31.06	**-.13**
Physical Fitness Assessment	17,357	131.30	20.91	5,044	109.80	28.87	**.94**
Core CBEF Biodata Scales							
Achievement Orientation (RD-adjusted)	22,188	4.21	.39	6,340	4.36	.34	**-.41**
Army Identification (RD-adjusted)	22,188	4.15	.46	6,340	3.99	.49	**.35**
Fitness Motivation (RD-adjusted)	22,188	3.99	.55	6,340	3.50	.54	**.90**
Hostility to Authority (RD-adjusted) [a]	22,188	1.53	.36	6,340	1.43	.33	**.28**
Stress Tolerance (RD-adjusted)	22,188	3.43	.38	6,340	3.32	.39	**.29**
Response Distortion [a]	22,188	.09	.15	6,340	.11	.17	**-.13**
Experimental CBEF Biodata Scales							
Coachability	10,759	3.95	.57	2,953	3.97	.57	**-.04**
Equity Sensitivity	10,740	2.37	.48	2,951	2.35	.47	**.04**
Goal Orientation	6,630	4.40	.48	2,095	4.34	.49	**.13**
Instrumentality of ROTC Funding	4,818	3.84	.86	1,294	4.02	.80	**-.22**
Instrumentality of Army to Career Goals	4,818	2.98	.70	1,294	2.81	.69	**.24**
Interest in Leadership	13,898	4.11	.54	3,921	4.13	.56	-.03
Manipulativeness [a]	4,818	2.27	.42	1,294	2.16	.40	**.27**
Peer Leadership	17,370	3.91	.57	5,046	4.06	.56	**-.26**
Past Withdrawal Propensity [a]	11,448	1.79	.42	3,388	1.77	.42	**.04**
Self-Efficacy	22188	4.38	.39	6339	4.40	.39	**-.07**
Tolerance for Injury	11,448	3.71	.62	3,388	3.48	.62	**.38**
Written Communication	3,472	3.46	.54	1,124	3.65	.54	**-.36**

Note. M-F d = (M_{Male} — M_{Female})/Pooled Male-Female *SD*. CBEF = Cadet Background and Experiences Form. Bolded values indicate significant differences at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

The gender differences observed in this sample are comparable to past research involving the CBEF. For example, Kilcullen, Putka, and McCloy (2007) found that first-term male Soldiers tended to have higher Fitness Motivation, Stress Tolerance, and Army Identification scores

relative to their female counterparts, and female Soldiers tended to have higher Achievement scores relative to their male counterparts. Waters and Waugh (2008) found similar results, with the addition of a sizable difference in Fitness Motivation favoring males.

Race/Ethnicity Differences

Descriptive statistics and Cohen's *d* effect sizes for comparisons between (a) White, non-Hispanic (White) and Black, non-Hispanic (Black) cadets and between (b) White and Hispanic cadets appear in Table 3.6. As shown, effect sizes for race/ethnicity differences on the predictors ranged from (a) -0.61 to 1.00 for White–Black comparisons, and (b) -.31 to 43 for White–Hispanic comparisons. On average, Whites tended to score moderately higher than Blacks on CBEF v1.0 (d = 0.37) and CBEF v2.0 (d = 0.45). In contrast, small differences between White and Hispanic cadets were observed for CBEF v1.0 (d = 0.11) and CBEF v2.0 (d = 0.08).

Among the core CBEF scales, Whites tended to have moderately higher scores than did Blacks on Army Identification (d = 0.37), Fitness Motivation (d = 0.41), and Stress Tolerance (d = 0.29). Similarly, Whites tended to score higher than Hispanics on Army Identification (d =0.06), Fitness Motivation (d = 0.13), and Stress Tolerance (d = 0.14), although these differences were small. In contrast, Blacks tended to have slightly higher scores than did Whites on Achievement Orientation (d = -0.06). Blacks and Hispanics both tended to have higher scores than Whites on the Response Distortion Scale (d = -0.49 and -0.18, respectively) for which *lower* scores are considered better scores. These race/ethnicity differences in CBEF scales bear resemblance to past research involving the CBEF. For example, Waters and Waugh (2008) found that White cadets tended to have moderately higher scores on Army Identification, Fitness Motivation, and Stress Tolerance relative to Black cadets. Among the experimental CBEF scales, Blacks tended to perform moderately higher than did Whites on Instrumentality of ROTC Funding Scores (d = - 0.61), but moderately lower on Tolerance for Injury (d = 0.53). With the exception of the differences noted, only small differences between cadets of different race/ethnicities were observed on the experimental CBEF scales.

With regard to the WPS and WPS plus CBEF composite scores, Whites were found to have higher scores than both Blacks and Hispanics. The effect sizes were large for differences between White and Black cadets (*Mean d* = 0.94), but moderate for differences between White and Hispanic cadets (*Mean d* = 0.36). These differences likely were driven by Board Points and SAT/ACT Points. Given that the WPS has a large cognitive ability component to it (e.g., College Board scores), and summaries of past research have demonstrated Black–White differences of about 0.83 standard deviations on measures of cognitive ability (with Whites tending to score higher than Blacks; Schmitt et al., 1996), this pattern of findings are within what would be expected of past research. However, the magnitude of the White–Black differences observed here were still quite large in comparison to what has been documented in the literature.

Table 3.6. Descriptive Statistics for Racial–Ethnic Comparisons Among Four-Year Scholarship Applicants from F10–F16

	White, Non-Hispanic			Black, Non-Hispanic			Hispanic			W-B	W-H
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*d*	*d*
CBEF Composite Score											
CBEF v1.0	17,647	133.78	37.52	1,408	119.68	41.45	2,271	129.80	38.36	**0.37**	**0.11**
CBEF v2.0	17,647	130.50	36.55	1,408	113.75	42.71	2,271	127.44	39.47	**0.45**	**0.08**
Whole Person Score (WPS)											
Historical WPS without CBEF	13,642	661.47	104.58	1,022	571.05	99.79	1,666	626.57	102.31	**0.87**	**0.33**
Historical WPS + CBEF v1.0	13,629	796.99	114.81	1,018	693.71	109.55	1,662	759.19	113.14	**0.90**	**0.33**
WPS without CBEF	10,357	801.02	113.39	774	693.16	115.00	1,286	758.03	112.22	**0.95**	**0.38**
WPS + CBEF v1.0	10,348	937.14	124.20	772	816.51	124.45	1,284	890.76	124.07	**0.97**	**0.37**
WPS + CBEF v2.0	10,334	933.61	120.73	761	812.74	124.74	1,279	889.87	121.83	**1.00**	**0.36**
WPS Components											
Athlete Points	17,647	33.26	13.51	1,408	27.69	15.20	2,271	30.56	14.40	**0.41**	**0.20**
Board Points	17,647	208.29	56.69	1,408	168.72	50.07	2,271	192.01	54.28	**0.70**	**0.29**
Scholar Points	17,647	20.73	11.45	1,408	20.85	10.88	2,271	20.21	11.28	-0.01	**0.05**
Leader Points	17,647	32.36	12.05	1,408	31.37	13.38	2,271	31.50	12.90	**0.08**	**0.07**
SAT/ACT	17,647	166.54	31.42	1,408	135.77	24.90	2,271	152.99	31.00	**0.99**	**0.43**
PMS Interview Score	17,647	173.95	32.08	1,408	161.70	37.57	2,271	169.94	34.25	**0.38**	**0.12**
Physical Fitness Assessment	13,174	128.15	23.49	1,069	114.10	30.75	1,731	123.91	25.98	**0.58**	**0.18**
Core CBEF Biodata Scales											
Achievement Orientation (RD-adjusted)	17,647	4.24	0.38	1,408	4.26	0.37	2,271	4.23	0.38	**-0.06**	0.02
Army Identification (RD-adjusted)	17,647	4.14	0.46	1,408	3.97	0.52	2,271	4.11	0.47	**0.37**	**0.06**
Fitness Motivation (RD-adjusted)	17,647	3.91	0.57	1,408	3.67	0.65	2,271	3.84	0.59	**0.41**	**0.13**
Hostility to Authority (RD-adjusted) [a]	17,647	1.51	0.36	1,408	1.53	0.34	2,271	1.51	0.35	-0.05	0.02
Stress Tolerance (RD-adjusted)	17,647	3.42	0.38	1,408	3.31	0.42	2,271	3.37	0.39	**0.29**	**0.14**
Response Distortion [a]	17,647	.08	.15	1,408	.16	.22	2,271	.11	.18	**-0.49**	**-0.18**

(continued)

Table 3.6. (Continued)

	White, Non-Hispanic			Black, Non-Hispanic			Hispanic			W-B	W-H
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*d*	*d*
Experimental CBEF Biodata Scales											
Coachability	10,042	3.94	.56	767	4.07	.60	1,261	3.95	.60	**-.23**	-.02
Equity Sensitivity	10,028	2.35	.47	767	2.39	.54	1,258	2.37	.48	**-.01**	-.05
Goal Orientation	3,157	4.39	.47	303	4.44	.48	474	4.42	.49	**-.12**	-.08
Instrumentality of ROTC Funding	4,462	3.79	.86	338	4.31	.68	539	4.03	.79	**-.61**	**-.28**
Instrumentality of Army to Career Goals	4,462	2.94	.69	338	2.83	.72	539	2.94	.70	**.16**	.00
Interest in Leadership	13,080	4.14	.53	1,061	4.06	.60	1,713	4.1	.56	**.14**	**.07**
Manipulativeness [a]	4,462	2.24	.41	338	2.24	.46	539	2.25	.41	.00	-.02
Peer Leadership	13,185	3.93	.56	1,070	4.04	.60	1,732	3.97	.59	**-.20**	**-.08**
Past Withdrawal Propensity [a]	7,618	1.79	.41	641	1.84	.43	1,013	1.83	.43	**-.11**	**-.09**
Self-Efficacy	17,646	4.37	.39	1,408	4.46	.41	2,271	4.4	.40	**-.23**	**-.07**
Tolerance for Injury	7,618	3.72	.61	641	3.39	.65	1,013	3.65	.62	**.53**	**.10**

Note. W-B $d = (M_{White} - M_{Black})$/Pooled White-Black *SD.* W-H $d = (M_{White} - M_{Hispanic})$/Pooled White-Hispanic *SD.* CBEF = Cadet Background and Experiences Form. Bolded values indicate significant differences at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Summary

In summary, our examination of the functioning of the four-year scholarship CBEF during operational use yielded findings consistent with previous research. The results support past evidence that the CBEF is not redundant with the WPS and continues to offer potential utility for complementing the WPS in predicting important ROTC outcomes.

Gender/racial differences found with the current four-year scholarship CBEF (CBEF v2.0) composite are relatively small, and do not exacerbate the differences found when it is incorporated into the WPS. Although CBEF v2.0 showed lower gender subgroup differences than did CBEF v1.0, White–Black subgroup differences still were present. It may be beneficial for future research to explore whether alternative scoring algorithms may reduce subgroup differences without attenuating the optimization of the CBEF for predicting disenrollment. Our results also revealed sizable racial-ethnic subgroup differences for the WPS. The effects of such differences on scholarship award decisions should continue to be evaluated over time.

CHAPTER 4: ROTC OUTCOMES

Sean Baldwin and Kerrin E. Puente (HumRRO)

The focal research questions addressed by the ROTC Longitudinal research project involve the CBEF's relationship with outcome variables critical to cadets' continuance and performance in ROTC. Namely, we examine the CBEF's relationship with key criteria associated with each year of a cadet's enrollment in ROTC, using indicators of academic performance (cumulative GPA), physical strength (APFT), and continuance (disenrollment). Other key indicators of ROTC cadet performance are the OMS and the OML ranking. These values are assigned after the completion of Advanced Camp and are an important factor affecting cadet's branch assignment. Additionally, they afford cadets the opportunity to commission in the Regular Army (vs. the U.S. Army Reserves). Below, we describe each source of criteria in more detail.

ROTC Outcomes

The ROTC outcomes data includes criteria on students whom were tracked by USACC since they enrolled in ROTC college courses. We capture each of these variables in the fall following a given academic year. Accordingly, we accumulate over time the following criteria for each cadet's first through fourth year in ROTC:

Disenrollment: Enrollment status is a cumulative variable, coded as 0 (enrolled) or 1 (disenrolled), and identifies whether a cadet disenrolled prior to starting the next academic year. For example, a cadet whom identified as disenrolled in the second-year cumulative disenrollment variable, disenrolled during their first year or second year, but did not start his/her third year as an ROTC cadet.

GPA: College GPA is cumulated across academic years and includes grades for both ROTC and regular (non-ROTC) college courses. For example, second year cumulative GPA includes course grades from all classes (ROTC and non-ROTC) in a cadet's first and second academic year. Higher scores indicate higher academic achievement.

APFT: The APFT is administered to cadets at least once annually. The academic year APFT score represents the most recent APFT score captured during that academic year in the ROTC outcomes data extract. For example, second year APFT is the most recent APFT score recorded during the cadet's second year of military science. Higher scores indicate higher physical ability.

Outcome Metric Score (OMS) and Order of Merit List (OML): The OML is a national rank-order of cadets who are in their senior year and about to graduate. The national OML model includes several variables intended to measure cognitive ability, physical ability, and leadership performance. The variables are weighted and summed to form the OMS. High scores indicate higher performance. The OMS is used to rank-order cadets within a given cohort. Lower rank indicates higher OMS and higher standing. The rank order is referred to as OML rank.

The OML model, which is used to compute OMS and ultimately OML rank, changes periodically. Table 4.1 presents the score components of OML models for the commissioning years that correspond to our applicant samples (e.g., the 2014 OML model would be used to calculate OMS for our F10 applicant sample who commissioned in 2014). The OML model is currently composed of three broad performance dimensions: Academic, Leadership and Physical outcomes. Note that the 2014 OML model combined the Physical outcomes into the Leadership outcomes.[12]

The components of the Leadership outcomes have remained consistent over time, although the proportional make-up of it has changed slightly, with the largest change coming from the removal of LDAC performance outcomes in the 2015–2017 model. The Academic outcomes have shown more drastic change over time. Early OML models solely relied on cumulative GPA to inform the Academic outcomes. Beginning in 2015, cumulative GPA contributed 37.5% less to the Academic outcomes, with the introduction of several standardized assessments (i.e., Miller Analogies Test [MAT], the Collegiate Learning Assessment [CLA+], and Cadet Developmental Assessment [CDA]).

Despite proportional changes within performance areas, the OMS has consistently been calculated as a composite of Academic, Leadership, and Physical abilities. Due to the changes in calculation across cohorts, we standardized OMS and OML rank within cohort prior to running our validation analyses. This effort ensures that we capture within cohort rank-order while centering all OMS onto a common scale (Mean=0, Standard Deviation=1).

[12] The Leadership outcomes of this model represented 60 points of the total OMS, 45 of which were associated with Leadership and 15 of which were associated with Physical.

Table 4.1. Comparison of Order of Merit List (OML) Models

Four-year Scholarship Cohort/ Advanced Camp Cohort/ Commissioning Year	F10/ 2013/ 2014[a]	F11-F13/ 2014-2016/ 2015-2017	F14/ 2017/ 2018
Score component			
Academic Outcomes	40.0	50.0	40.0
Cumulative GPA (Spring Semester Junior)	40.0	25.0	26.0
Standardized Tests: CLA+	0.0	5.0	5.0
Standardized Tests: MAT	0.0	5.0	0.0
Cadet Developmental Assessment	0.0	6.0	0.0
Academic Discipline (ADM)	0.0	4.0	4.0
Command Interest Items: Writing	0.0	2.0	0.0
Command Interest Items: Speaking	0.0	2.0	0.0
Command Interest Items: Community Awards	0.0	1.0	0.0
Language / Cultural Awareness [b]	0.0	0.0	5.0
Leadership Outcomes	45.0	35.0	45.0
LDAC/ Advanced Camp Performance	11.3	0.0	15.0
LDAC Platoon Tactical Evaluation	6.8	0.0	0.0
PMS MSIII Cadet Evaluation Report OML	11.3	12.5	11.0
PMS Accessions OML	4.5	12.5	12.0
PMS Accessions Potential Comments	4.5	0.0	0.0
Cadet Training / Extracurricular Activities	4.5	5.0	5.0
Language / Cultural Awareness	2.3	5.0	0.0
Maturity and Responsibility	0.0	0.0	2.0
Physical Outcomes [c]	15.0	15.0	15.0
APFT: Campus (Most current fall Semester)	3.5	6.5	5.5
APFT: Campus (Most current Spring Semester)	3.5	6.5	5.5
APFT: LDAC (1st Score)	6.5	0.0	0.0
Athletics: Varsity, Intramural, or Community Team	1.5	2.0	4.0
Total (Academic + Leadership + Physical Outcomes)	100	100	100

Note. MAT = Miller Analogies Test; CLA+ = the Collegiate Learning Assessment.; PMS = Professors of Military Science; MSIII = Military Science III course All OML models are scored on a 100-point scale, thus all values are both maximum allowable scores and percentage of the total OMS.

[a] Cadets could earn additional points toward their OMS under the 2014 model. These include: 1 point for top five for Warrior Forge Platoon; ½ point for graduating from a Reconnaissance and Commando (RECONDO) school; 1 point for academic majors in Math/Science or Engineering.

[b] The 2017 OML model moved Language and Cultural Awareness from Leadership Outcomes into Academic Outcomes.

[c] In the 2014 model, physical outcomes was included in the Leadership outcomes. It is shown as a separate component to facilitate comparison.

Results

Table 4.2 presents the descriptive statistics for the outcome variables for the 4R scholarship recipients in the F10–F16 cohorts. First through fourth years' outcomes are presented as well as unstandardized[13] OMS and OML rank. Descriptive statistics for the outcome variables for all four-year scholarship recipients are presented in Appendix C, broken out by cohorts.

The cumulative coding of disenrollment (e.g., once a record is coded as disenrolled, they are disenrolled in subsequent outcome extracts) results in a pattern of increasing disenrollment by year in ROTC. APFT scores, which are not cumulative, show a slight increase with each year in ROTC with the exception of fourth-year APFT scores, which tend to be lower. Similar to APFT, the average cumulative GPA tends to increase for cadets' first three years, but drops slightly in their fourth year. These fluctuations in APFT and GPA should be interpreted cautiously, given the variability within each cohort for these variables. Applicant cohorts' unstandardized OML Rank and OMS Scores are presented; however, these values are not fully comparable across cohorts due to changes in the OML model.

Table 4.2. Criteria Descriptive Statistics of 4R Scholarship Recipients (F10–F16)

	n	*M*	*SD*
1st Year Outcomes			
Disenrollment	5,527	0.15	0.36
APFT	4,832	265.48	31.05
Cumulative GPA	5,205	3.19	0.57
2nd Year Outcomes			
Disenrollment	4,256	0.19	0.40
APFT	3,499	273.25	28.57
Cumulative GPA	4,162	3.22	0.53
3rd Year Outcomes			
Disenrollment	3,407	0.24	0.43
APFT	2,835	281.62	25.96
Cumulative GPA	3,217	3.28	0.50
4th Year Outcomes			
Disenrollment	3,074	0.29	0.45
APFT	2,121	273.65	27.45
Cumulative GPA	2,188	3.25	0.54
2014 OML Outcomes			
Cadet OML Rank	619	2,188.55	1,511.93
OMS	909	76.52	9.39
2015-2017 OML Outcomes			
Cadet OML Rank	1,433	1,871.67	1,456.90
OMS	1,432	59.83	13.83

[13] We present the descriptive statistics for the unstandardized OMS because the mean and standard deviation of the standardized OMS is 0 and 1, respectively.

CHAPTER 5: CRITERION-RELATED VALIDITY EVIDENCE FOR THE HIGH SCHOOL CBEF

Kerrin E. Puente and Jennifer P. Green (HumRRO)

This chapter presents criterion-related validity evidence regarding the potential of CBEF composite scores and scales to predict (a) disenrollment, (b) cumulative GPA, (c) Army Physical Fitness Test (APFT) scores, and (d) Order of Merit List (OML) outcomes for 4R scholarship recipients who started ROTC in 2010–2017 (F10–F17). We also report on the incremental validity of the CBEF beyond the WPS.

Sample Characteristics

Analyses were conducted for 4R scholarship recipients who applied for and received scholarships for the F10–F16 academic years. Cadets included in the sample are those who had complete CBEF and WPS data, were designated as 4R scholarship types, enrolled in ROTC on campus as a freshman, and had first-year ROTC outcomes (see Chapter 2 for more information on the validation sample and inclusion criteria). Although the CBEF is currently being used to award 4R, 3D, and QE scholarships, it originally was designed for and validated on 4R scholarship cadets. As such, results are discussed for 4R cadets, specifically (see Chapter 2 for more information). Results for all four-year scholarship recipients (4R, 3D, and QE) combined are presented in Appendix D.

As described in Chapter 3, the predictors of interest included the WPS, the CBEF composite scores, and the core CBEF scales. While the CBEF is a part of the current WPS, we were interested in the incremental validity provided by the CBEF beyond the other components of the WPS. Accordingly, we computed a WPS without the CBEF score, which included SAT/ACT scores, Student-Athlete-Leadership (SAL) scores, Professor of Military Science (PMS) interview scores, promotion board scores, and a Physical Fitness Assessment (PFA; referred to as the WPS without CBEF). For more information on the predictors included in the current analyses, refer to Chapter 3.

As described in Chapter 4, the criteria of interest included first through fourth year ROTC outcomes: disenrollment, GPA, and APFT scores. For all cadets, first-year outcomes correspond to cadet's freshman year. In addition, OML outcomes are included as criteria in the current analyses. Because OML data are collected as part of the commissioning process after cadets' junior years of college, OML data were available only for cadets who applied for scholarships for the F10–F14 academic years (see Figure 2.1). As there have been many changes to the OML model over time, scores on OML outcomes were standardized within Advanced Camp cohort and combined across cohorts for analysis (see Chapters 1 and 4 for additional information).

Results

Optimization of WPS plus CBEF

To evaluate the CBEF's potential to enhance the selection of 4R scholarship recipients, we examined the optimal weighting of the CBEF and WPS in predicting key ROTC outcomes. This approach involved testing a series of two-step hierarchical regression models using Ordinary Least Squares (OLS) regression, in which scores on each outcome measure were regressed onto cadet's WPS in the first step, followed by scores on either the (a) CBEF v1.0, (b) CBEF v2.0, or (c) core CBEF scales in the second step. In each case, we evaluated the degree to which adding the predictor(s) in the second step served to provide incremental validity beyond the WPS with respect to the criterion of interest. We focused our analyses on the current WPS (including the PFA). Because the PFA was not introduced until F12, the results effectively exclude the F10 and F11 cohorts. As noted above, results for CBEF v2.0 are reported separately for the F14–F16 cohorts as this sample reflects an independent cross-validation sample.

We computed cross-validity estimates to adjust the observed *R* and Δ*R* for shrinkage. These estimates enable comparisons of results across models from different samples and with different number of predictors. Specifically, we adjusted the observed *R* estimates associated with each step in the models using Burket's (1964) formula for population cross-validity (cf. Schmitt & Ployhart, 1999):

$$\rho_c = (N*R^2 - k)/[R*(N - k)]$$

where ρ_c equals the estimated population cross-validity (i.e., shrinkage-adjusted *R*), *R* equals the observed multiple correlation, *k* equals the number of predictors in the model, and *N* equals the sample size. Next, we computed the difference of the adjusted *R* estimates by subtracting the adjusted *R* associated with the WPS-only model from the adjusted *R* obtained from the full model (e.g., the WPS + CBEF model).

Results of the analyses CBEFv2.0 and disenrollment are presented in Table 5.1. The WPS significantly predicted all outcomes, except for disenrollment. Notably, CBEF v2.0 significantly predicted additional variance beyond the WPS in first-, second-, and third-year disenrollment (*ΔR* = .065.21 – .090).

Table 5.1. Incremental Validity Results Among 4R Scholarship Recipients from F14–F16

		WPS Only	WPS + CBEF v2.0		
	n	*R*	*R*	*ΔR*	*Adj. ΔR* [a]
1st year disenrollment	2,309	.012	**.088**	**.076**	.102
2nd year disenrollment	1,635	.017	**.078**	**.061**	.081
3rd year disenrollment	839	.013	**.103**	**.090**	.159

Note. 4R = Traditional four-year scholarship. WPS = Whole Person Score. CBEF = Cadet Background and Experiences Form. Adj ΔR = Increment in estimated population cross-validity and is the difference between the adjusted R for WPS only and the adjusted R for WPS+CBEF. Significance is not indicated for Adj. ΔR values. WPS includes ACT/SAT, Scholar-Leader-Athlete, PMS Interview, Board Points, and Physical Fitness Assessment. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

[a] ΔR is based on the difference between the WPS only and the WPS + CBEF composite.

Table 5.2 provides the regression analyses for all other comparisons using F12–F16 samples. Both scores for CBEF v1.0 and CBEF v2.0 added significantly, albeit small, utility to the prediction of first-year APFT scores (ΔR = .009 and .004, respectively). Neither CBEF v1.0 nor CBEF v2.0 added to the prediction of GPA or any OML outcome beyond the WPS. However, the combination of core CBEF scales added significantly to the prediction of all outcomes beyond WPS (ΔR = .025 – .188), with the scales adding small to moderate prediction beyond WPS.

Table 5.2. Incremental Validity Results Among 4R Scholarship Recipients from F12–F16

		WPS Only	WPS + CBEF v1.0			WPS + CBEF v2.0			WPS + CBEF Scales [a]		
	n	*R*	*R*	*ΔR* [b]	*Adj. ΔR* [b]	*R*	*ΔR* [b]	*Adj. ΔR* [b]	*R*	*ΔR* [c]	*Adj. ΔR* [c]
1st year outcomes											
APFT	3,252	**.132**	**.141**	**.009**	.007	**.136**	**.004**	.002	**.301**	**.169**	.166
GPA	3,441	**.183**	**.185**	.002	.000	**.183**	.000	-.002	**.231**	**.048**	.042
Disenrollment	3,636	.022	.034	.012	.008				**.097**	**.075**	.071
2nd year outcomes											
APFT	2,368	**.101**	**.104**	.003	-.001	**.103**	.002	-.002	**.261**	**.160**	.155
GPA	2,551	**.187**	**.188**	.001	-.001	**.187**	.000	-.002	**.248**	**.061**	.054
Disenrollment	2,961	.003	.026	.023	.110				**.085**	**.082**	.171
3rd year outcomes											
APFT	1,714	**.126**	**.126**	.000	-.005	**.132**	.006	.002	**.280**	**.154**	.147
GPA	1,708	**.140**	**.141**	.001	-.003	**.141**	.001	-.003	**.180**	**.040**	.025
Disenrollment	2,165	.009	.026	.017	.033				**.106**	**.097**	.122
4th year outcomes											
APFT	901	**.105**	**.108**	.003	-.007	**.110**	.005	-.005	**.293**	**.188**	.178
GPA	936	**.129**	**.130**	.001	-.007	**.136**	.007	.000	**.198**	**.069**	.046
Disenrollment	1,326	.013	.013	.000	-.058				**.109**	**.096**	.113
Standardized OML Outcomes											
Standardized OMS	1,256	**.240**	**.240**	.000	-.003	**.240**	.000	-.003	**.267**	**.027**	.013
Standardized OML Rank	1,256	**.225**	**.225**	.000	-.003	**.225**	.000	-.003	**.250**	**.025**	.010

Note. 4R = Traditional four-year scholarship. WPS = Whole Person Score. CBEF = Cadet Background and Experiences Form. APFT = Army Physical Fitness Test. GPA = Grade point average. Adj ΔR = Increment in estimated population cross-validity and is the difference between the adjusted R for WPS only and the adjusted R for WPS+CBEF. Significance is not indicated for Adj. ΔR values. Negative Adj. ΔR values should be interpreted as 0. Negative Adj. R values are plausible when models contain terms that do not contribute to prediction. WPS includes ACT/SAT, Scholar-Leader-Athlete, PMS Interview, Board Points, and Physical Fitness Assessment. Because OML models change over time, OML outcomes were standardized within Advanced Camp cohort and combined across cohorts. Bolded values indicate statistical significance at $p < .05$ (two-tailed). Because the optimization of the CBEF v2.0 was based on all regular 4R cadets from the F11, F12, and F13 cohorts, observed correlations for CBEF v2.0 and disenrollment are not reported for the current sample.

[a] CBEF scales include the six scales that are currently included in the CBEF v2.0 composite.

[b] ΔR is based on the difference between the WPS only and the WPS + CBEF composite.

[c] ΔR is based on the difference between the WPS only and the WPS + CBEF scales.

Bivariate Correlations

Table 5.3 presents the correlation results between the WPS, CBEF, and disenrollment. Because the optimization of the CBEF v2.0 was based on all regular 4R cadets from the F11, F12, and F13 four-year scholarship cohorts who had data on the first-year disenrollment criterion variable, observed validities for CBEF v2.0 in predicting disenrollment may be inflated when the F11–F13 cohorts are included in the sample. Thus, correlations between CBEF v2.0 and disenrollment are reported for 4R scholarship recipients from F14–F16 in Table 5.3. The relationships between first-year disenrollment and the CBEF v2.0 composite scores were significant albeit small (r = -.08). In contrast, the relationship between the WPS and first-year disenrollment was not significant (r = .01). These patterns were consistent for second- through third-year disenrollment. WPS plus CBEF v2.0 (r = -.04) was not significantly related to first-year disenrollment, suggesting that the addition of the CBEF to WPS is not providing incremental validity in predicting first-year disenrollment given the current weighting of WPS components (see Chapter 3 for additional information on the WPS components). Of note, WPS plus CBEF v2.0 was significantly related to 2nd year disenrollment (r = -.06). Given the CBEF scales add significant incremental validity beyond the WPS (see Table 5.1), an alternative weighting of the WPS and CBEF scales than is currently used may improve the utility of the CBEF in predicting disenrollment.

Table 5.3. Sample Correlations Between CBEF v2.0 and Disenrollment for 4R Scholarship Recipients from F14–F16

	CBEFv2.0	WPS without CBEF	WPS + CBEF v2.0
1st year disenrollment	**-.08**	.01	-.04
2nd year disenrollment	**-.07**	-.02	**-.06**
3rd year disenrollment	**-.11**	-.01	-.07

Note. 4R = Traditional four-year scholarship. CBEF = Cadet Background and Experiences Form. n = 838–2451. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

Correlations among WPS, CBEF, and all other ROTC outcomes are presented in Table 5.4. We observed similar results for the CBEF v1.0 composite as the CBEF v2.0 composite. The CBEF scales with the highest prediction utility for disenrollment were Army Identification and Hostility to Authority. With regards to the experimental scales, small correlations with first-year disenrollment were observed for Coachability (r = -.04) and Past Withdrawal Propensity (r = .06).

CBEF composite scores also were significantly related to first-year (r = .08 and r = .05 for CBEF v1.0 and CBEF v2.0, respectively) and second-year APFT scores (r = .05 and r = .05 for CBEF v1.0 and CBEF v2.0, respectively). The correlations between first-year APFT scores and (a) WPS (r = .13) and (b) WPS plus CBEF (r = .14) were larger; this pattern held for second-, third-, and fourth-year APFT. By far, the CBEF scale with the strongest relationship with first-year APFT scores was Fitness Motivation (r = .29), consistent with theoretical expectations. Similarly, the PFA had the strongest relationship with first-year APFT scores compared to other WPS components (r = .39).

The CBEF v2.0 composite score also was significantly, but modestly related to first through third-year GPA (r = .03 – .04). CBEF v1.0 was not related to GPA at any time-point. Like APFT, relationships between first-year GPA and (a) WPS (r = .18), (b) WPS plus CBEF

v1.0 (r = .15), and (c) WPS plus CBEF v2.0 (r = .17) were larger. This pattern is not surprising given that the WPS has a large cognitive ability component (e.g., college entrance [ACT/SAT] scores). Among the CBEF scales, Achievement Orientation showed the strongest significant correlation with GPA.

CBEF v1.0 was related to OMS (r = .06), but CBEF v2.0 was not related significantly to OMS (r = .03). The core CBEF scales related to OMS were (a) Achievement Orientation (r = .13) and (b) Fitness Motivation (r = .12). In comparison, WPS and WPS plus CBEF v1.0 and v2.0 were related to OMS, with the relationship between OMS and WPS and WPS plus CBEF ranging from .22 to .24. Except for Scholar Points, all WPS components were positively related to OMS (r = .04 – .21).

Table 5.4 Sample Correlations Between WPS, CBEF, and Outcomes for 4R Scholarship Recipients from F10–F16

	1st Year Outcomes			2nd Year Outcomes		
	APFT	GPA	Disenroll	APFT	GPA	Disenroll
CBEF Composite Score						
CBEF v1.0	**.15**	.00	**-.07**	**.05**	.00	**-.05**
CBEF v2.0 [a]	**.05**	**.04**	**-**	**.05**	**.03**	**-**
Whole Person Score (WPS)						
Historical WPS without CBEF	**.11**	**.20**	-.01	**.05**	**.19**	.01
Historical WPS + CBEF v1.0	**.13**	**.18**	**-.04**	**.07**	**.17**	-.01
WPS without CBEF	**.13**	**.18**	.02	**.10**	**.19**	.00
WPS + CBEF v1.0	**.14**	**.15**	.01	**.10**	**.16**	-.01
WPS + CBEF v2.0	**.14**	**.17**	**-**	**.10**	**.17**	**-**
WPS Components						
Athlete Points	**.13**	.01	-.03	**.08**	.02	-.02
Board Points	**.12**	**.20**	-.02	**.08**	**.18**	.00
Scholar Points	-.01	**.07**	**-.04**	-.03	**.06**	-.02
Leader Points	**.04**	.01	-.02	.02	.02	-.02
SAT/ACT	.02	**.15**	.03	-.02	**.13**	**.03**
PMS Interview Score	**.11**	**.12**	-.02	.03	**.10**	.00
Physical Fitness Assessment	**.39**	**.06**	**-.05**	**.34**	**.06**	**-.08**
Core CBEF Biodata Scales						
Achievement Orientation (RD-adjusted)	**.06**	**.15**	**-.03**	.03	**.14**	**-.04**
Army Identification (RD-adjusted)	.00	**-.07**	**-.07**	-.01	**-.07**	**-.05**
Fitness Motivation (RD-adjusted)	**.29**	.00	-.01	**.23**	-.01	-.02
Hostility to Authority (RD-adjusted) [b]	-.02	**-.07**	**.07**	-.02	**-.09**	**.07**
Stress Tolerance (RD-adjusted)	.01	**-.05**	.01	.00	**-.03**	.01
Response Distortion [b]	.00	**-.03**	**.03**	-.02	-.01	.03
Experimental CBEF Biodata Scales						
Coachability	**-.06**	-.02	**-.04**	**-.08**	-.01	**-.05**
Equity Sensitivity	-.01	.01	-.01	-.02	-.01	-.01
Goal Orientation	-.02	**-.09**	**-.07**	**-.08**	**-.15**	-.05
Instrumentality of ROTC Funding	**-.11**	**-.09**	.04	**-.14**	**-.08**	.05
Instrumentality of Army to Career Goals	-.02	**-.06**	-.01	.02	**-.07**	-.03
Interest in Leadership	.00	.01	.00	-.01	.02	-.01
Manipulativeness	**-.06**	-.05	.03	-.02	-.05	.02
Peer Leadership	-.02	.01	.01	**-.04**	.02	.00
Past Withdrawal Propensity	-.03	.00	**.06**	.00	.00	.03
Self-Efficacy	.00	-.02	.01	-.02	-.03	.02
Tolerance for Injury	.03	**-.07**	.00	**.05**	**-.09**	.01

(continued)

Table 5.4 (Continued)

	3rd Year Outcomes			4th Year Outcomes		
	APFT	GPA	Disenroll	APFT	GPA	Disenroll
CBEF Composite Score						
CBEF v1.0	.03	.02	**-.05**	.03	.02	**-.04**
CBEF v2.0 [a]	.02	**.04**	-	.01	.03	-
Whole Person Score (WPS)						
Historical WPS without CBEF	**.07**	**.15**	.00	**.14**	**.19**	**-.05**
Historical WPS + CBEF v1.0	**.07**	**.15**	-.02	**.13**	**.17**	**-.06**
WPS without CBEF	**.13**	**.14**	-.01	**.10**	**.13**	-.01
WPS + CBEF v1.0	**.12**	**.13**	-.02	**.09**	**.11**	-.01
WPS + CBEF v2.0	**.10**	**.13**	-	**.08**	**.11**	-
WPS Components						
Athlete Points	**.04**	.01	-.01	**.13**	.02	.00
Board Points	**.08**	**.14**	-.01	**.14**	**.18**	**-.06**
Scholar Points	**-.05**	**.05**	-.03	**-.06**	.01	-.02
Leader Points	.00	.01	-.03	.02	**.04**	-.01
SAT/ACT	.00	**.10**	**.04**	**.05**	**.14**	-.01
PMS Interview Score	.03	**.08**	-.01	**.10**	**.14**	**-.06**
Physical Fitness Assessment	**.30**	.03	**-.09**	**.29**	.03	**-.06**
Core CBEF Biodata Scales						
Achievement Orientation (RD-adjusted)	.01	**.12**	**-.05**	**.05**	**.14**	**-.06**
Army Identification (RD-adjusted)	-.01	-.03	**-.04**	-.04	-.04	-.02
Fitness Motivation (RD-adjusted)	**.17**	.00	-.02	**.23**	.02	-.03
Hostility to Authority (RD-adjusted) [b]	.00	**-.06**	**.09**	-.01	**-.05**	**.11**
Stress Tolerance (RD-adjusted)	-.01	**-.04**	.02	-.04	**-.04**	.02
Response Distortion [b]	.00	-.01	.02	.03	.01	.03
Experimental CBEF Biodata Scales						
Coachability	**-.07**	-.03	-.04	**-.08**	-.05	-.04
Equity Sensitivity	.01	-.01	-.01	.00	-.03	-.01
Goal Orientation	-	-	-	-	-	-
Instrumentality of ROTC Funding	**-.12**	**-.09**	**.06**	**-.15**	**-.11**	**.07**
Instrumentality of Army to Career Goals	.01	-.04	-.01	-.05	**-.11**	.05
Interest in Leadership	-.01	.02	.00	.02	.05	.01
Manipulativeness	-.01	-.03	.03	.01	.00	.01
Peer Leadership	**-.05**	-.01	.03	.00	.05	.05
Past Withdrawal Propensity	.02	.02	-.03	.00	.02	-.01
Self-Efficacy	-.02	-.03	.03	-.01	.01	**.04**
Tolerance for Injury	-.01	-.04	.01	.05	**-.07**	.04

(continued)

Table 5.4. (Continued)

	Standardized OML Outcomes	
	OMS	OML Rank
CBEF Composite Score		
CBEF v1.0	**.06**	-.03
CBEF v2.0	.03	-.01
Whole Person Score (WPS)		
Historical WPS without CBEF	**.24**	**-.21**
Historical WPS + CBEF v1.0	**.24**	**-.20**
WPS without CBEF	**.24**	**-.22**
WPS + CBEF v1.0	**.23**	**-.21**
WPS + CBEF v2.0	**.22**	**-.20**
WPS Components		
Athlete Points	**.06**	**-.05**
Board Points	**.21**	**-.20**
Scholar Points	.03	-.02
Leader Points	**.04**	-.04
SAT/ACT	**.20**	**-.18**
PMS Interview Score	**.13**	**-.11**
Physical Fitness Assessment	**.18**	**-.17**
Core CBEF Biodata Scales		
Achievement Orientation (RD-adjusted)	**.13**	**-.10**
Army Identification (RD-adjusted)	-.02	.03
Fitness Motivation (RD-adjusted)	**.12**	**-.09**
Hostility to Authority (RD-adjusted) [b]	-.04	.03
Stress Tolerance (RD-adjusted)	.00	.01
Response Distortion [b]	.00	-.01
Experimental CBEF Biodata Scales		
Coachability	**-.08**	**.08**
Equity Sensitivity	**-.06**	**.06**
Goal Orientation	-	-
Instrumentality of ROTC Funding	**-.14**	**.13**
Instrumentality of Army to Career Goals	-.06	**.08**
Interest in Leadership	.04	-.04
Manipulativeness	-.01	.00
Peer Leadership	.00	.00
Past Withdrawal Propensity	-.01	.04
Self-Efficacy	.00	.01
Tolerance for Injury	.05	**-.08**

Note. 4R = Traditional four-year scholarship. CBEF = Cadet Background and Experiences Form. APFT = Army Physical Fitness Test. GPA = Grade point average. n = 620–5,526. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

[a] Because the optimization of the CBEF v2.0 was based on all regular 4R cadets from the F11, F12, and F13 cohorts, observed correlations for CBEF v2.0 and disenrollment are not reported for the current sample.

[b] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Implementation

In addition to investigating validity estimates, we also examined the disenrollment rates by CBEF v2.0 composite scores. Figure 5.1 shows that cadets in the top quartile of CBEF v2.0 scores (Q4) had the lowest second year disenrollment rate, and cadets in the bottom quartile of CBEF scores (Q1) had the highest second-year disenrollment rate. Further, those in the bottom quartile had nearly double the disenrollment of those with the highest CBEF v2.0 scores. While the statistical significance of the CBEF is limited, the practical significance of the CBEF on disenrollment is apparent with these results.

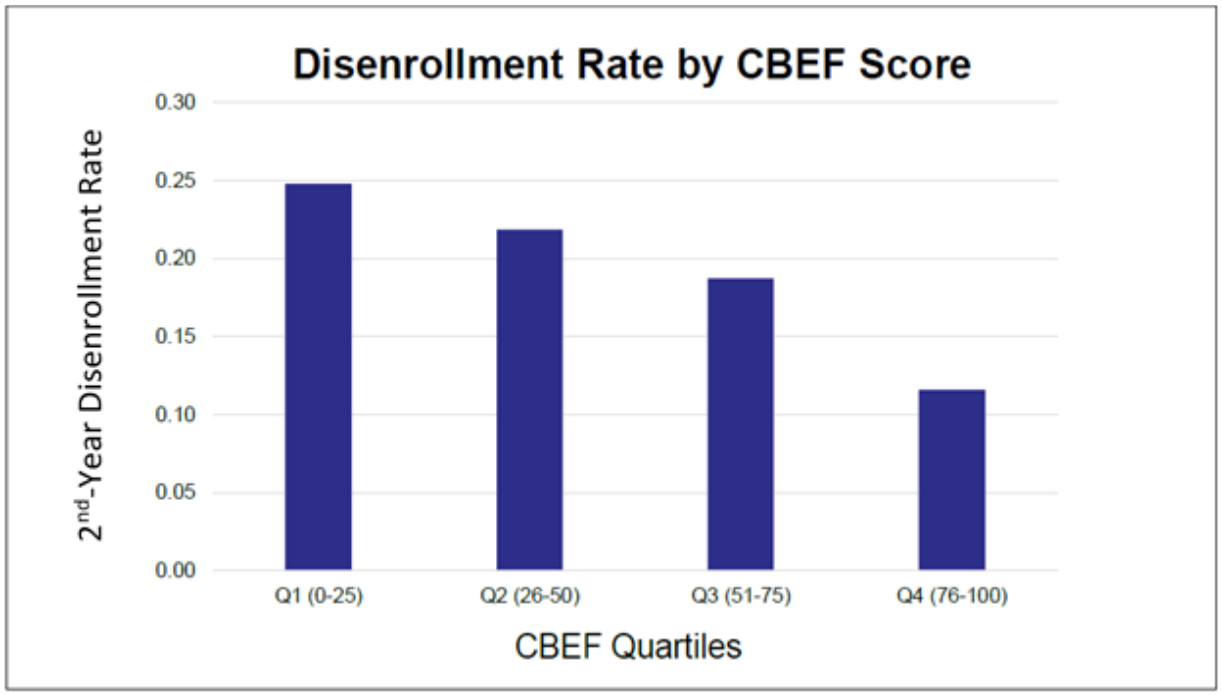


Figure 5.1. Second-year disenrollment rate by CBEF v2.0 score.
Note. n = 896, sample includes F14 4R scholarship recipients.

Summary

This chapter provides validity results of the CBEF for cadets who were awarded 4R scholarships for the F10 through F16 academic years. The results suggest that the current operational version of the CBEF (CBEF v2.0) added utility to the prediction of second-year disenrollment scores beyond the WPS. The results further suggest that the WPS plus CBEF v2.0 could be optimized to predict first- through third-year disenrollment. However, implementation would require thoughtful evaluation of the weighting assigned to all WPS components.

It is possible that correlations between CBEF, WPS, and ROTC outcomes could be attenuated by range restriction in the current sample because 4R scholarship recipients are selected based on the WPS and CBEF. As described in Chapter 3, the four-year scholarship applicant sample and the 4R validation sample exhibited similar variability, expressed as the coefficient of variation, in CBEF and WPS composite scores. However, the ratios of standard deviations of WPS composite scores from the 4R validation sample to the four-year applicant

sample were moderate, suggesting that range restriction may need to be considered when interpreting the results presented here. We recommend that ARI consider conducting analyses to address range restriction in future analyses.

We will continue to monitor the predictive validity of the CBEF for future scholarship samples as criterion data become available. Future samples will help to provide information on the stability of these results.

CHAPTER 6: ADVANCED CAMP

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This chapter describes the basic psychometric properties of the Advanced Camp CBEF scales, as well as the key criteria of interest for the 2015–2017 Advanced Camp cohorts. Specifically, for the predictor variables we examine (a) distributional properties (e.g., mean, standard deviation), (b) reliability estimates, (c) subgroup differences, and (d) intercorrelations among the scales. For the criterion variables, we examine (a) distributional properties and (b) scale intercorrelations. Finally, we examine the relationships (via correlations) between the predictors and criteria of interest for all cadets who attended Advanced Camp, as well as for the 4R scholarship recipients only. In 2015, USACC eliminated several performance measures assessed at Advanced Camp (e.g., LDAC performance, APFT) and made significant changes to the OML model (described in Chapter 4). Because of these changes, the following analyses focus on cohorts who attended Advanced Camp in 2015, 2016, and 2017.

Advanced Camp Predictors

The CBEF and additional experimental measures were administered to ROTC cadets who attended Advanced Camp. Data collected at Advanced Camp is used for research purposes only. Each year the Advanced Camp data collection form is updated to include new experimental scales and to remove scales that are not performing well. The six core CBEF scales used to compute the CBEF v2.0 score always are included, in addition to six to ten experimental scales. While the core scales are adjusted for response distortion, the experimental scales are not. The 2015-2017 Advanced Camp CBEF scales are summarized in Table 6.1.

Table 6.1. Predictors Administered at 2015, 2016 and 2017 Advanced Camp

	Cohort		
	2015	2016	2017
Core CBEF Biodata Scales			
Achievement Orientation	x	x	x
Army Identification	x	x	x
Fitness Motivation	x	x	x
Hostility to Authority [a]	x	x	x
Stress Tolerance	x	x	x
Response Distortion [a]	x	x	x
Experimental CBEF Biodata Scales			
Aggression [a]	x		
Self-Efficacy	x	x	x
Guilt Proneness		x	
Need for Power	x		
Oral Communication	x		
Past Withdrawal Propensity [a]	x	x	x
Peer Leadership	x	x	x
Self-Disclosure	x		
Shame Proneness		x	
Tolerance for Injury	x	x	x
Written Communication	x	x	x

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Descriptive Statistics

The sample size and distributional properties (mean and standard deviation) for the core CBEF scales and the experimental CBEF scales among the 2015–2017 Advanced Camp cohorts are provided in Table 6.2.[14] Additionally, we computed the High School CBEF v2.0 composite score using the Advanced Camp CBEF data. While the core Advanced Camp CBEF scales have been edited to be appropriate for Advanced Camp, we believe the scales are largely measuring the same construct. Evaluating the High School CBEF composite with Advanced Camp data allows us to compare the correlations among the composite score and other experimental CBEF scales. Sample size and distributional properties for the CBEF scales for the 4R scholarship recipients are provided in Appendix E. As the five core CBEF scales used for the CBEF composite are RD-adjusted, the results reported in this chapter will emphasize the RD-adjusted core CBEF scales. The results for the Experimental CBEF scales are based on all the items administered.

Means of the core CBEF scales ranged from 1.92 (Hostility to Authority) to 4.05 (Achievement Orientation). For the experimental CBEF biodata scales, means ranged from 2.11 (Past Withdrawal Propensity) to 4.41 (Self-Efficacy). Scores on the Hostility to Authority, Response Distortion, and Past Withdrawal Propensity scales are negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Reliability estimates for the core CBEF scales and the experimental CBEF scales also are provided in Table 6.2. Among the CBEF scales, reliability estimates were acceptable, with a few exceptions. Hostility to Authority, Past Withdrawal Propensity, Shame Proneness, Guilt Proneness, and Need for Power exhibited reliability estimates less than .70.

[14] We do not report alphas for lie-adjusted scales because the adjustment occurs after the scale score is already computed, not at the item level.

Table 6.2. Reliability and Sample Descriptive Statistics for CBEF Scales in the 2015–2017 Advanced Camp Cohorts

	k	*α*	*n*	*M*	*SD*
CBEF Composite v2.0	6	.62	15,579	100.03	44.92
Core CBEF Biodata Scales (unadjusted)					
Achievement Orientation	9	.71	15,582	4.14	0.51
Army Identification	11	.81	15,582	4.00	0.55
Fitness Motivation	8	.81	15,582	3.89	0.64
Hostility to Authority [a]	4	.52	15,579	1.82	0.52
Stress Tolerance	10	.70	15,582	3.24	0.50
Core CBEF Biodata Scale					
Achievement Orientation (RD-adjusted)	-	-	15,582	4.05	0.50
Army Identification (RD-adjusted)	-	-	15,582	3.93	0.54
Fitness Motivation (RD-adjusted)	-	-	15,582	3.85	0.64
Hostility to Authority (RD-adjusted) [a]	-	-	15,579	1.92	0.50
Stress Tolerance (RD-adjusted)	-	-	15,582	3.12	0.48
Response Distortion	7	.72	15,582	.11	.17
Experimental CBEF Biodata Scales					
Aggression [a]	8	.76	5,542	2.45	0.65
Self-Efficacy	6	.75	15,582	4.41	0.43
Guilt Proneness	9	.69	5,317	4.01	0.48
Need for Power	9	.69	5,542	2.76	0.52
Oral Communication	11	.71	5,544	3.95	0.42
Past Withdrawal Propensity [a]	8	.61	15,582	2.11	0.46
Peer Leadership	6	.81	15,580	3.75	0.64
Self-Disclosure	14	.73	5,546	2.80	0.47
Shame Proneness	10	.69	5,317	2.78	0.51
Tolerance for Injury	5	.72	15,582	3.74	0.72
Written Communication	7	.76	15,582	3.29	0.69

Note. k = number of items/scales in the composite. Scales listed as *RD-adjusted* are corrected using the Response Distortion scale. All other scales are based on the raw response values.
[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Subgroup Differences

We examined mean differences in CBEF scores across various subgroups. Tables 6.3 and 6.4 summarize the gender subgroup differences and racial-ethnic subgroup differences, respectively, for the CBEF composite, the core CBEF scales, and the experimental CBEF scales. These tables provide the means and standard deviations for each subgroup, as well as Cohen's *d* effect sizes (Cohen, 1988) reflecting standardized mean differences between the subgroups.

For the CBEF composite, we observed a small difference between males and females with higher scores for females (d = -0.15). We observed a moderate White–Black difference (d = 0.39) and smaller White, non-Hispanic and Hispanic differences (d = 0.12), both favoring Whites. The moderate difference in the White–Black scores for the CBEF composite likely is due to the large subgroup difference on the Response Distortion scale (d = -0.69), with Whites scoring significantly lower.

Effect sizes on the RD-adjusted core CBEF scales ranged from (a) -0.42 to 0.85 for gender comparisons, (b) -0.01 to 0.31 for White–Black comparisons, and (c) -0.05 to 0.24 for White, non-Hispanic–Hispanic comparisons. For the RD-adjusted core CBEF scales, subgroup

differences were moderate between males and females, with males scoring significantly higher in all core CBEF scales, except for Achievement Orientation (where females scored significantly higher). Subgroup differences were largest for Fitness Motivation (d = 0.85), with males scoring significantly higher.

For the experimental CBEF scales, effect sizes ranged from (a) -0.55 to 0.64 for gender comparisons, (b) -0.28 to 0.55 for White–Black comparisons, and (c) -0.19 to 0.26 for White, Non-Hispanic–Hispanic comparisons. Race/ethnicity group differences for the experimental CBEF scales were, on average, similar to those for the core CBEF scales.

Gender differences for the experimental CBEF scales were, on average, smaller than the differences for the core CBEF scales. However, we observed moderate male–female differences for the Aggression (d = 0.64) and Guilt Proneness (d = -0.55), with males scores significantly higher on Aggression and females scoring significantly higher on Guilt Proneness. Of note, both these scales were administered only to the 2016 Advanced Camp cohort. Tolerance for Injury was administered to all the Advanced Camp cohorts, and we observed moderate male–female differences (d = 0.53), as well as moderate White–Black differences (d = 0.55), with the majority groups scoring higher.

Table 6.3. Gender Subgroup Differences for CBEF Scales in the 2015–2017 Advanced Camp Cohorts

	Male			Female			M - F
	n	*M*	*SD*	*n*	*M*	*SD*	*d*
CBEF Composite v2.0	9,903	99.80	44.64	2,772	106.68	44.69	**-0.15**
Core CBEF Biodata Scales (unadjusted)							
Achievement Orientation	9,905	4.10	0.52	2,772	4.32	0.45	**-0.45**
Army Identification	9,905	4.03	0.55	2,772	3.98	0.54	**0.09**
Fitness Motivation	9,905	4.01	0.61	2,772	3.51	0.60	**0.83**
Hostility to Authority	9,903	1.86	0.53	2,772	1.70	0.47	**0.31**
Stress Tolerance	9,905	3.29	0.48	2,772	3.11	0.52	**0.37**
Core CBEF Biodata Scales (Lie Adjusted)							
Achievement Orientation	9,905	4.02	0.50	2,772	4.23	0.45	**-0.42**
Army Identification	9,905	3.97	0.54	2,772	3.91	0.53	**0.11**
Fitness Motivation	9,905	3.98	0.60	2,772	3.47	0.60	**0.85**
Hostility - Social Maturity	9,903	1.94	0.50	2,772	1.80	0.45	**0.30**
Stress Tolerance	9,905	3.17	0.47	2,772	2.97	0.49	**0.43**
Response Distortion	9,905	.10	.17	2,772	.12	0.18	**-0.11**
Experimental CBEF Biodata Scales							
Aggression [a]	4,350	2.53	0.64	1,190	2.13	0.58	**0.64**
Self-Efficacy	9,905	4.41	0.42	2,772	4.41	0.43	0.00
Guilt Proneness	4,089	3.95	0.48	1,220	4.21	0.44	**-0.55**
Need for Power	4,350	2.78	0.52	1,190	2.66	0.51	**0.24**
Oral Communication	4,352	3.95	0.42	1,190	3.96	0.42	-0.01
Past Withdrawal Propensity [a]	9,905	2.10	0.46	2,772	2.06	0.46	**0.08**
Peer Leadership	9,904	3.75	0.63	2,771	3.78	0.66	**-0.05**
Self-Disclosure	4,354	2.80	0.47	1,190	2.79	0.47	0.00
Shame Proneness	4,089	2.75	0.51	1,220	2.88	0.52	**-0.26**
Tolerance for Injury	9,905	3.83	0.70	2,772	3.46	0.74	**0.53**
Written Communication	9,905	3.26	0.67	2,772	3.43	0.70	**-0.25**

Note. M-F = Standardized mean difference: Male–Female. CBEF = Cadet Background and Experiences Form. Bolded values indicate significant differences at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table 6.4. Racial–Ethnic Subgroup Differences for CBEF Scales in the 2015–2017 Advanced Camp Cohorts

	White, Non-Hispanic			Black			Hispanic			W-B	W-H
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*d*	*d*
CBEF Composite v2.0	8,732	103.79	43.40	1,272	86.42	48.45	1,150	98.52	45.76	**0.39**	**.12**
Core CBEF Biodata Scales (unadjusted)											
Achievement Orientation	8,732	4.14	0.51	1,272	4.23	0.49	1,152	4.15	.49	**-0.18**	-0.03
Army Identification	8,732	4.02	0.54	1,272	3.97	0.56	1,152	4.09	.51	**0.08**	**-0.13**
Fitness Motivation	8,732	3.94	0.64	1,272	3.78	0.63	1,152	3.87	.65	**0.24**	**0.11**
Hostility to Authority	8,732	1.84	0.51	1,272	1.79	0.55	1,150	1.76	.52	**0.09**	**0.15**
Stress Tolerance	8,732	3.27	0.48	1,272	3.24	0.53	1,152	3.24	.53	**0.06**	0.05
Core CBEF Biodata Scales (Lie Adjusted)											
Achievement Orientation	8,732	4.07	0.50	1,272	4.08	0.48	1,152	4.02	.48	-0.01	**0.10**
Army Identification	8,732	3.97	0.54	1,272	3.86	0.54	1,152	3.99	.50	**0.20**	-0.05
Fitness Motivation	8,732	3.91	0.63	1,272	3.71	0.62	1,152	3.81	.65	**0.31**	**0.16**
Hostility - Social Maturity	8,732	1.91	0.49	1,272	1.95	0.51	1,150	1.90	.46	**-0.09**	0.02
Stress Tolerance	8,732	3.17	0.47	1,272	3.02	0.50	1,152	3.06	.49	**0.32**	**0.24**
Response Distortion	8,732	.09	.14	1,272	.19	0.23	1,152	.16	.22	**-0.69**	**-0.51**
Experimental CBEF Biodata Scales											
Aggression [a]	3,820	2.47	0.64	611	2.39	0.65	536	2.30	.63	**0.13**	**0.26**
Self-Efficacy	8,732	4.39	0.42	1,272	4.51	0.41	1,152	4.48	.43	**-0.28**	**-0.19**
Guilt Proneness	3,433	3.99	0.48	537	4.06	0.50	483	4.02	.49	**-0.14**	-0.05
Need for Power	3,820	2.74	0.52	611	2.83	0.53	536	2.75	.50	**-0.18**	-0.03
Oral Communication	3,821	3.96	0.40	611	3.99	0.45	536	3.99	.42	-0.07	-0.07
Past Withdrawal Propensity [a]	8,732	2.07	0.45	1,272	2.10	0.50	1,152	2.07	.45	**-0.07**	0.00
Peer Leadership	8,731	3.77	0.62	1,272	3.82	0.68	1,152	3.76	.66	**-0.09**	0.02
Self-Disclosure	3,822	2.80	0.47	611	2.74	0.48	537	2.81	.47	**0.13**	-0.01
Shame Proneness	3,433	2.80	0.50	537	2.61	0.55	483	2.71	.53	**0.37**	**0.17**
Tolerance for Injury	8,732	3.82	0.70	1,272	3.43	0.74	1,152	3.69	.74	**0.55**	**0.18**
Written Communication	8,732	3.29	0.69	1,272	3.35	0.66	1,152	3.30	.68	**-0.08**	-0.01

Note. W-B = Standardized mean difference: White-Black. W-H = Standardized mean difference: White, Non-Hispanic-Hispanic. Bolded d values indicate statistical significance at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Intercorrelations

We examined the intercorrelations among all 23 scales (CBEF composite, core CBEF scales, experimental CBEF scales) for all cadets in the 2015–2017 Advanced Camp cohorts (Table 6.5). We found similar patterns and strengths of relationships when comparing results for all cadets to the 4R scholarship recipients. Results for 4R scholarship recipients are provided in Appendix E. The core CBEF scales showed a pattern of meaningful relationships with each other. For instance, negative correlations were observed for Hostility to Authority scale with the other four core CBEF scales. On average, the core CBEF scales were minimally to moderately correlated with one another.

The core RD-adjusted CBEF scales and the experimental CBEF scales showed statistically significant correlations that were minimally to moderately correlated with one another. Some of the strongest relationships were between Stress Tolerance and Shame Proneness (r = -.50), Fitness Motivation and Tolerance for Injury (r = .48), and Achievement Orientation and Peer Leadership (r = .37).

Regarding correlations among the experimental CBEF scales, some of the strongest statistically significant relationships were between Peer Leadership, Self-Efficacy, and Oral Communication, with the correlations between these scales ranged from .52 to .64. As might be expected, Written Communication and Oral Communication showed a moderate statistically significant correlation (r = .44).

Table 6.5. Sample Correlations Between CBEF Scales in the 2015–2017 Advanced Camp Cohorts

		Core CBEF Biodata Scales (unadjusted)						Core CBEF Biodata Scales (Lie Adjusted)					
		1	2	3	4	5	6	7	8	9	10	11	12
1	CBEF Composite v2.0	1.00											
	Core CBEF Biodata Scales (unadjusted)												
2	Achievement Orientation	**.19**	1.00										
3	Army Identification	**.48**	**.30**	1.00									
4	Fitness Motivation	**.08**	**.18**	**.25**	1.00								
5	Hostility to Authority	**-.55**	**-.26**	**-.16**	-.01	1.00							
6	Stress Tolerance	**-.18**	**.14**	**.20**	**.28**	**-.27**	1.00						
	Core CBEF Biodata Scales (Lie Adjusted)												
7	Achievement Orientation	**.30**	**.96**	**.26**	**.16**	**-.17**	**.07**	1.00					
8	Army Identification	**.56**	**.27**	**.98**	**.23**	**-.10**	**.15**	**.28**	1.00				
9	Fitness Motivation	**.12**	**.16**	**.23**	**1.00**	**.02**	**.26**	**.16**	**.24**	1.00			
10	Hostility - Social Maturity	**-.69**	**-.22**	**-.13**	**.02**	**.96**	**-.20**	**-.20**	**-.12**	**.03**	1.00		
11	Stress Tolerance	**-.03**	**.06**	**.14**	**.25**	**-.14**	**.92**	**.10**	**.16**	**.26**	**-.19**	1.00	
12	Response Distortion	**-.39**	**.20**	**.16**	**.10**	**-.33**	**.27**	**-.07**	**-.02**	.01	**-.06**	**-.12**	1.00
	Experimental CBEF Biodata Scales												
13	Aggression [a]	.01	**-.20**	**.07**	**.15**	**.40**	**-.26**	**-.14**	**.12**	**.17**	**.35**	**-.17**	**-.25**
14	Self-Efficacy	**.07**	**.47**	**.36**	**.35**	**-.18**	**.33**	**.41**	**.31**	**.32**	**-.11**	**.23**	**.27**
15	Guilt Proneness	**.15**	**.32**	**.17**	.02	**-.33**	**.12**	**.26**	**.14**	.00	**-.28**	**.04**	**.24**
16	Need for Power	-.01	.03	**.10**	**.08**	**.29**	**-.23**	**.06**	**.13**	**.09**	**.28**	**-.19**	**-.12**
17	Oral Communication	**.06**	**.43**	**.36**	**.30**	**-.24**	**.42**	**.36**	**.31**	**.27**	**-.17**	**.31**	**.28**
18	Past Withdrawal Propensity [a]	**-.20**	**-.30**	**-.44**	**-.22**	**.30**	**-.37**	**-.24**	**-.41**	**-.20**	**.25**	**-.29**	**-.23**
19	Peer Leadership	**.05**	**.42**	**.32**	**.30**	**-.06**	**.23**	**.37**	**.29**	**.28**	-.01	**.16**	**.19**
20	Self-Disclosure	**-.04**	**.07**	**.09**	.02	**-.07**	**.20**	**.04**	**.07**	.01	**-.04**	**.16**	**.10**
21	Shame Proneness	**.13**	**-.05**	**-.16**	**-.22**	**.17**	**-.59**	.02	**-.12**	**-.19**	**.11**	**-.50**	**-.29**
22	Tolerance for Injury	**.08**	**.07**	**.36**	**.48**	**.11**	**.21**	**.07**	**.36**	**.48**	**.12**	**.22**	-.01
23	Written Communication	**.02**	**.40**	**.13**	**.08**	**-.15**	**.20**	**.37**	**.10**	**.07**	**-.11**	**.14**	**.15**

(continued)

Table 6.5. (Continued)

		Experimental CBEF Biodata Scales										
		13	14	15	16	17	18	19	20	21	22	23
1	CBEF Composite v2.0											
	Core CBEF Biodata Scales (unadjusted)											
2	Achievement Orientation											
3	Army Identification											
4	Fitness Motivation											
5	Hostility to Authority											
6	Stress Tolerance											
	Core CBEF Biodata Scales (Lie Adjusted)											
7	Achievement Orientation											
8	Army Identification											
9	Fitness Motivation											
10	Hostility - Social Maturity											
11	Stress Tolerance											
12	Response Distortion											
	Experimental CBEF Biodata Scales											
13	Aggression [a]	1.00										
14	Self-Efficacy	**-.08**	1.00									
15	Guilt Proneness	-	**.21**	1.00								
16	Need for Power	**.39**	**.05**	-	1.00							
17	Oral Communication	**-.17**	**.55**	-	**-.03**	1.00						
18	Past Withdrawal Propensity [a]	**.13**	**-.38**	**-.30**	**.15**	**-.43**	1.00					
19	Peer Leadership	-.02	**.52**	**.17**	**.15**	**.64**	**-.30**	1.00				
20	Self-Disclosure	**-.14**	**.08**	-	**-.10**	**.15**	**-.15**	**.09**	1.00			
21	Shame Proneness	-	**-.33**	**.06**	-	-	**.27**	**-.22**	-	1.00		
22	Tolerance for Injury	**.30**	**.25**	-.01	**.15**	**.23**	**-.26**	**.26**	.00	**-.13**	1.00	
23	Written Communication	**-.20**	**.26**	**.21**	**-.03**	**.44**	**-.15**	**.40**	**.04**	**-.09**	**.03**	1.00

Note. CBEF = Cadet Background and Experiences Form. n =5,316–15,582. Bolded values indicate statistical significance at $p < .05$ (two-tailed).
[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Comparison of the High School and Advanced Camp CBEF

Cadets who apply for four-year scholarships take alternative versions of the CBEF at two points in time: (a) prior to starting ROTC as a freshman in college and (b) during Advanced Camp, after their junior year of college. These two administrations allow us to evaluate the relationship of these two CBEF versions over time. While the two versions of the CBEF measure the same constructs, many of the items are worded differently to be relevant to the experiences of high school students and college students. The high school CBEF include items that focus on experiences in high school while the Advanced Camp CBEF focus on experiences that occurred in college or in work setting. The correlations of scales and composites among the high school CBEF and the Advanced Camp CBEF was modest, ranging from .22 to .53 (See Table 6.6). Because more than three years elapsed between when data were collected on the high school CBEF and Advanced Camp CBEF and because the CBEF focuses on different experiences, we did not expect high correlations among the two CBEF administrations. Specifically, high school applicants and cadets are likely to use different reference points when responding to the biodata items because of the life experiences gained in the first three years of college as well as the intervention-like experience of ROTC. For example, high school applicants draw upon their experiences in high school when responding to items that reference school experiences. Whereas, college students are likely to draw upon their experiences in college when responding to these same questions. Further, because the intervention-like experience of ROTC, there is a high likelihood that cadet's behaviors as a high school senior will differ from those as a college junior.

Table 6.6. Test-Retest Reliability Between Applicant and Advanced Camp CBEF Scales

Scale	F11 & L14 (n = 1,379 – 1,169)	F12 & L15 (n = 1,460)	Combined (n = 1,169 – 2,839)
CBEF Composite v1.0	**.32**	**.27**	**.30**
CBEF Composite v2.0	**.20**	**.24**	**.22**
Core CBEF Scales			
Achievement Orientation	**.40**	**.32**	**.36**
Army Identification	**.40**	**.34**	**.37**
Fitness Motivation	**.53**	**.54**	**.53**
Hostility to Authority	**.25**	**.37**	**.30**
Stress Tolerance	**34**	**.33**	**.33**
Lie Scale	**.27**	**.30**	**.29**
Experimental CBEF Scales			
General Self-Efficacy	**.34**	**.29**	**.31**
Peer Leadership	--	**.48**	**.48**
Tolerance for Injury	**.49**	--	**.49**

Outcomes for Advanced Camp Cohorts

The outcome of interest for the Advanced Camp cohorts include OMS and fourth-year ROTC outcomes. The OMS is used to rank order all ROTC cadets in their senior year. The OMS has changed over time (see Chapter 4), however three broad categories of performance have persisted: Academic outcomes, leadership outcomes, and physical outcomes. The OMS is used to rank-order cadets within a given cohort. Higher rank (i.e. rank 1) is an indication of higher

OMS and higher standing. Because the component weights used to form the overall OMS varied from 2015 to 2017, OMS was standardized within cohort for these analyses.

The fourth-year APFT score is captured during the cadet's fourth academic year. Fourth-year cumulative GPA includes course grades from all classes in a cadet's first, second, third, and fourth academic years. Fourth-year disenrollment is a cumulative variable; however, if someone attended Advanced Camp (i.e., included in our 2015, 2016 or 2017 sample) and identified as disenrolled in the fourth-year, this means he or she must have disenrolled after attending Advanced Camp. Disenrollment is a dichotomous variable in which one represents disenrollment and zero represents enrollment. Fourth-year outcomes were not yet available for the 2017 cohort and, as such, the 2017 cohort is included only in the analyses including OMS.

Descriptive Statistics

Table 6.7 presents the sample size and distributional properties of the OMS and the fourth-year ROTC outcomes for each cohort separately and for the 2015–2017 Advanced Camp cohorts combined. The by-cohort reported means and standard deviations for OMS are unstandardized within cohort. The fourth-year outcomes were similar across the 2015 and 2016 Advanced Camp cohorts. As disenrollment is a dichotomous variable, disenrollment means demonstrate that approximately 4% of the cadets who attended Advanced Camp in 2015 and 2016 disenrolled during their fourth year as a ROTC cadet. This does not reflect cumulative disenrollment because one must have attended Advanced Camp, thus not have disenrolled prior to their fourth year, in order to be included in these analyses.

Table 6.7. Sample Descriptive Statistics for Advanced Camp Outcomes by Cohort

	L15-L17			L15			L16			L17		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
OML Outcomes												
OMS	12,628	0.01	1.00	5,165	50.54	14.39	3,908	51.42	14.57	3,555	55.74	14.46
Fourth-year outcomes												
APFT	3,140	275.02	24.17	1,600	275.54	23.47	1,421	274.68	24.66	-	-	-
GPA	8,744	3.25	0.46	4,613	3.24	0.51	3,970	3.25	0.40	-	-	-
Disenrollment	8,518	.04	.20	3,736	.04	.20	4,623	.04	.20	-	-	-

Note. OML outcomes were standardized for 2015-2017 Advanced Camp cohort results. APFT = Army Physical Fitness Test. GPA = Grade point average.

Intercorrelations

We examined the intercorrelations among the criterion variables for all cadets in the 2015–2017 Advanced Camp cohorts (Table 6.8) and for the 4R scholarship recipients only. We found similar patterns and strengths of relationships when comparing results for all cadets to the 4R scholarship recipient group. Details on the 4R scholarship recipient results are provided in Appendix E. The correlation among the outcomes were statistically significant and the pattern of relationships were expected. Specifically, the relationships between OMS outcomes and fourth-year outcomes of APFT and GPA were strong and positive for OMS, with correlations ranging from .49 to .63. For dichotomous criteria, such as disenrollment, low base rates can attenuate observed correlations. Thus, the relationship between disenrollment and OMS was weak but in the expected directions, where cadets with lower OMS were more likely to disenroll. Also, consistent with expectations, APFT and GPA were positively related to each other and were negatively related to disenrollment.

Table 6.8. Sample Correlations between Criterion Variables in the 2015–2017 Advanced Camp Cohorts

	OMS	Fourth-Year APFT	Four-Year GPA
OML Outcomes			
OMS	**1.00**		
Fourth-year outcomes			
APFT	**.49**	**1.00**	
GPA	**.63**	**.22**	**1.00**
Disenrollment	**-.15**	**-.10**	**-.24**

Note. APFT = Army Physical Fitness Test. GPA = Grade point average. n = 2,823-12,629. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

Relationships between Advanced Camp CBEF and ROTC Outcomes

Correlations between predictors and outcomes for all cadets in the 2015–2017 Advanced Camp cohorts are presented in Table 6.9 (refer to Appendix E for results specific to 4R scholarship recipients). As previously mentioned, the CBEF composite exhibited significant correlations with many of the criteria of interest. The strongest relationships were with OMS (r = .14). Overall, Achievement Orientation was one of the strongest correlates of OMS among the core and experimental CBEF scales (r = .31). These findings are consistent with expectations given OMS is composed of several academic-related outcomes (e.g., GPA and cognitive ability test scores). Fitness Motivation exhibited moderate correlations with OMS (r = .30) and APFT (r = .41), which is expected as both outcomes include cadets' physical fitness performance. Correlations with OML and fourth-year outcomes were small for Army Identification (r = -.06 to .05), Stress Tolerance (r = -.18 to .18), and Hostility to Authority (r = -.14 to .14).

The experimental CBEF scales exhibit small to moderate relationships with the criteria of interest. Peer Leadership and Written Communication had the strongest relationships with OMS (r = .17 and .17, respectively). Written Communication also had the strongest relationship with fourth-year GPA (r = .19). Tolerance for Injury was the experimental scale most highly correlated with fourth-year APFT scores (r = .17). Many of these scales exhibited higher correlations than did some of our core CBEF scales. Overall, the relationships between the predictors and outcomes of interest were consistent with a priori expectations and suggest there could be promise in considering experimental scales as part of a composite for predicting OMS.

Table 6.9. Sample Correlations Between CBEF Scales and Criteria in the 2015–2017 Advanced Camp Cohorts

	Standardized OML Outcomes	Fourth-Year Outcomes		
	OMS	APFT	GPA	Disenrollment
CBEF Composite v2.0	**.14**	**.06**	**.07**	**-.06**
Core CBEF Biodata Scales (unadjusted)				
Achievement Orientation	**.28**	**.12**	**.29**	**-.06**
Army Identification	**.03**	**.04**	**-.04**	**-.06**
Fitness Motivation	**.29**	**.41**	**.05**	**-.05**
Hostility-Social Maturity	**-.11**	**-.05**	**-.12**	**.05**
Stress Tolerance	**.14**	**.08**	**.09**	**-.04**
Core CBEF Biodata Scales (Lie Adjusted)				
Achievement Orientation	**.31**	**.12**	**.30**	**-.06**
Army Identification	**.05**	.03	**-.03**	**-.06**
Fitness Motivation	**.30**	**.41**	**.05**	**-.06**
Hostility - Social Maturity	**-.14**	**-.05**	**-.13**	**.05**
Stress Tolerance	**.18**	**.08**	**.10**	**-.04**
Response Distortion	**-.09**	.03	**-.02**	.01
Experimental CBEF Biodata Scales				
Aggression [a]	**-.08**	**-.06**	**-.11**	.01
Self-Efficacy	**.13**	**.10**	**.10**	**-.05**
Guilt Proneness	**.09**	**.08**	**.10**	.00
Need for Power	**-.14**	-.04	**-.09**	.01
Oral Communication	**.13**	.04	**.07**	**-.05**
Past Withdrawal Propensity [a]	**-.09**	**-.06**	**-.03**	**.04**
Peer Leadership	**.17**	**.06**	**.07**	**-.03**
Self-Disclosure	.02	-.01	.01	**-.03**
Shame Proneness	.03	-.03	**.04**	.02
Tolerance for Injury	**.12**	**.17**	**-.05**	-.01
Written Communication	**.17**	**.05**	**.19**	-.02

Note. CBEF = Cadet Background and Experience Form. APFT = Army Physical Fitness Test. GPA = Grade point average. n = 1,421–12,627. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Summary

Overall, the results of the Advanced Camp analyses suggest that the CBEF demonstrated acceptable distributional properties and reliability, with some exceptions. Similarly, the OML outcomes and fourth-year outcomes demonstrated acceptable distributional properties. The intercorrelations among CBEF predictors and the outcomes of interest fit with a priori expectations and were similar in pattern and magnitude for the 4R scholarship recipients in these cohorts. Finally, a few CBEF scales demonstrated good prediction of the outcomes of interest, with some variability in the magnitude of these relationships for all cadets compared to the four-year scholarship recipients. Some of the strongest predictors included Achievement Orientation, Fitness Motivation, Stress Tolerance, Peer Leadership and Written Communication.

These predictors form the core scales for the new On-Campus CBEF that is designed to predict ROTC performance (see Appendix E). Plans call for the On-Campus CBEF to be implemented to help USACC award two- and three-year ROTC scholarships. Program disenrollment among these individuals is minimal; therefore, the primary concern is to award two- and three-year scholarships to those who are most likely to perform well in ROTC.

CHAPTER 7: SUMMARY AND FUTURE DIRECTIONS

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In this final chapter, we begin by summarizing some of the key findings and lessons learned from ARI's ROTC research effort over the past three years. Next, we highlight the technical issues that have made validation of the CBEF especially challenging. Finally, we describe some promising future directions for the program. Although our discussion focuses primarily on the testing program for four-year scholarships, the issues raised will generalize largely to other applications.

Background

ROTC is the primary commissioning source for Army officers and produces approximately half of its senior leaders who serve as General Officers. The U.S. Army Cadet Command (USACC) manages the four-year national ROTC scholarship program to encourage highly qualified high school seniors to become Army officers. Although approximately 2,000 scholarships are awarded to entering ROTC students each year, a significant portion will eventually drop out of the program, especially within the first two years. Thus, Disenrollment from the scholarship program creates a significant cost to the Army in terms of lost scholarship money (over $21,000 per student per year), lost training time/resources, and lost opportunities for awarding scholarships to others who might have otherwise completed the program and become successful officers.

The current effort described in this report extends an ongoing program of research which began in 2007. Our initial focus was to develop a new non-cognitive motivational measure (now called the CBEF) that could be used to help inform the award of four-year ROTC scholarships. The goal was to identify applicants who were more likely to successfully complete the ROTC program and become commissioned officers. Prior to including the CBEF in the scholarship assessment process, there had been a heavy emphasis on the evaluation of cognitive skills (SAT/ACT scores, high school grade point average). Such skills have consistently been related to program performance outcomes (e.g., GPA and APFT), but are not predictive of program completion. Adding CBEF to the process allowed for more of a holistic assessment by capturing critical motivational attributes important to both continuance and performance in ROTC—and possibly to the Army as well.

Since 2007, ARI's research program has been expanding to support the USACC personnel assessment requirements. The On-Campus CBEF was developed to help award scholarships to individuals who are already in the ROTC program, and it has been implemented at ROTC campuses nationwide. Another expected CBEF application is being designed to improve the USACC process to assign cadets to components and branches. Additional applications of CBEF for addressing the USACC's emerging personnel assessment needs (e.g., to help inform whether a cadet will be allowed to contract) are anticipated for the future.

Utility of the CBEF for Supporting ROTC Personnel Assessment

ARI's CBEF has a proven track record as a personnel assessment tool that can be used to predict the performance of both ROTC cadets and officers. While the focus of this report is on current applications for ROTC, other research has shown that the CBEF predicts continuance and performance outcomes for officers from diverse commissioning sources (e.g., see Allen et al., 2014; Allen & Young, 2012; Russell, et al., 2017; Zaccaro et al., 2015).[15] It also is a highly flexible and constantly evolving tool that can be adapted for multiple emerging applications. The CBEF testing program at the ROTC cadet summer training program, Advanced Camp (see Chapter 6), has been especially helpful to the process of improving the CBEF and creating new versions for USACC's emerging personnel assessment requirements.[16] The yearly testing opportunity at the Advanced Camp has served as an invaluable "test bed" for evaluating new experimental measures to help inform the 'High School' and 'On-Campus' CBEFs.

Supporting the Award of Four-Year Scholarships

The research completed over the past three years of our current program has confirmed that the operational testing of the CBEF for awarding four-year scholarships[17]consistently shows some level of validity. This finding is positive, given that the testing is taking place on such a large scale, in a very high-stakes environment, and without the benefit of proctoring (as the test is completed online). In addition, the key outcomes we are predicting (e.g., program withdrawal, GPA, APFT, OMS) occur years after applicants complete the CBEF as a part of the scholarship application package. There are long delays between the point at which the CBEF scores are captured (during the four-year scholarship application process), the time that a cadet begins his/her first year of college ROTC, and the maturation of the outcomes that emerge over the subsequent one, two, three, and four years of the cadet's pre-commissioning career.

As documented in earlier chapters, the psychometric properties of the operational CBEF are stable over time, and the correlations of individual scales against conceptually related criteria are generally consistent with expectations. For example, for each of the four academic years, Achievement Orientation was the best predictor of GPA (r = .12 to .15) and Fitness Motivation was the best predictor of APFT (r = .17 to .29; see Table 5.4).

Perhaps our most important finding has been the performance of the new CBEF composite (v2.0) under operational conditions in predicting cadet withdrawal from ROTC. This finding is critical because the reduction of withdrawal is the central purpose for incorporating CBEF into the WPS for evaluating four-year scholarship applicants. Across academic years, the validity of this composite is consistently higher than that of the original composite (v1.0), with coefficients ranging from r = -.07 to -.11 (from Table 5.2) using a cross-validation sample of combined F14, F15, and F16 cohorts. This order of magnitude is consistent with past research

[15] CBEF has been incorporated into the Army's Talent Assessment Battery (TAB) for use in making branching recommendations to USMA and ROTC cadets. It is also being used in assessments for special officer assignments (e.g., FA59 Army Strategists), and is being considered for use as a self-development tool for officers.
[16] The new On-Campus CBEF for informing the award of two- and three-year scholarships is a primary example.
[17] For the reasons outline in Chapter 2, the analyses referenced in this section are limited to the 4R group of scholarship awardees.

investigating the validity of temperament measures for predicting attrition in military samples (e.g., see White et al., 2001). Importantly, it has been demonstrated that a non-cognitive predictor with a validity as low as r = -.10 can have operational utility (White et al., 1993). We have also shown in one of our cross-validation subsamples (896 four-year scholarship recipients who entered ROTC in the 2014/2015 school year and were tracked through end of their sophomore year) that scholarship cadets scoring in the highest 25% on the CBEF had a program disenrollment rate of 12%; less than half the disenrollment rate of the cadets scoring in the lowest 25% (Young et al., 2018). In sum, the validity evidence supporting the new CBEF v2.0 composite as a predictor of disenrollment is robust. However, when the CBEF is combined with the WPS, we are only able to predict second-year disenrollment. This suggests that the CBEF may have more potential than what is actualized with the current operational configuration.

The new CBEF composite was found to have very small male/female differences, based on Cohen's benchmarks for *d* effect sizes, with males having the higher scores (d = .09, see Chapter 3, Table 3.5). Similarly, small differences were found between Whites and Hispanics (d = .08, see Table 3.6). Greater differences were noted between Whites and Blacks (d = .45), with Whites scoring higher. However, these small differences are not completely negated when added to the WPS. We see a slight increase in the White/Black score differences when the CBEF v2.0 is incorporated into the overall WPS score (i.e., d = .95 vs. 1.00 for the WPS without/with CBEF). Future research should explore the feasibility of reducing Black/White differences in the WPS by considering alternative weighting of the WPS components. Additionally, future research should explore whether the CBEF scale weights could be adjusted to maintain validity and reduce subgroup differences.

The CBEF is only helpful as an assessment tool to the extent that it has incremental validity—beyond that of the remaining components of the Whole Person Score (i.e., the WPS without CBEF). The results of our analyses show that the WPS without CBEF was not predictive of cadet disenrollment at any point in the four-year ROTC career (see Chapter 5, and Table 5.3). However, the WPS plus CBEF v2.0 was related to second-year disenrollment, suggesting the CBEF does provide some unique predictive variance. Importantly, the hierarchical regression models reported in Table 5.1 shows the CBEF v2.0 added significantly to the prediction of disenrollment through the first, second, and third years of ROTC enrollment. This finding suggests that the CBEF v2.0 currently is not being used in the operational WPS composite in a manner that optimally leverages its predictive validity. This is because applicants' CBEF scores contribute to the overall WPS (contributing a maximum of 250 points toward the maximum total score of 1,400 points) but are not weighted optimally relative to the remaining components (e.g., ACT/SAT, Scholar-Athlete-Leadership Score, physical fitness assessment). That is, the current operational use of the CBEF scores is *not* analogous to the way that the WPS-without CBEF and the CBEF v2.0 were combined and weighted in the hierarchical regression analysis. This point is well illustrated by examining the zero-order correlations reported in Table 5.3. The WPS *with* CBEF v2.0 only predicted disenrollment during the second year, while the CBEF *alone* consistently predicted disenrollment for each of the three years, with higher validity (r = -.07 to -.11). The implications of these findings will be further discussed later in this chapter.

There are a number of technical issues and research constraints that make our validation of the CBEF against continuance to be especially challenging and limit the magnitude of the

validity coefficients that can be obtained. We summarize these issues in the next section to provide background context to our proposed future directions.

Technical Constraints to Validating the CBEF

There are several factors that constrain the observed validities of the CBEF for predicting ROTC continuance and provide incremental validity beyond the WPS (without CBEF).

One validity limitation is a function of the available applicant samples with CBEF data. Only a small subset of newly enrolled cadets entered ROTC under a four-year scholarship (about 2,000 out of 11,000). Out of approximately 6,000 applicants, the 2,000 scholarships are awarded each year to those with the highest WPS (with CBEF) scores. Accordingly, there is considerable range restriction on the predictor measures for those highly vetted applicants/cadets—which constrains our validation findings. Further, USACC scholarship policies also impact attrition rates, and we see higher attrition rates among those scholarship winners who do not receive funding for their freshman year. Although the overall disenrollment rate for four-year scholarship cadets (some of whom do not receive funding their freshman year[18]) is about 30%, this rate is somewhat lower (about 24%) for those receiving funding as freshman. To address these types of research confounds, our model development generally has focused on the subset of scholarship awardees (about 1,000 cadets per academic year) for whom funding is provided throughout the entire four years of ROTC. These are the awardees that USACC considers to be the most competitive and desirable.

A second limitation relates to the disenrollment data provided to ARI by USACC. Currently, the cadet disenrollment data allows us only to partially disentangle voluntary from involuntary (e.g., due to illness, death, extreme personal hardship, or academic failure) separation among cadets. We believe that the undesired but necessary inclusion of both separation categories in our disenrollment criterion measures contributes to validity attenuation. This finding is consistent with past findings from U.S. Air Force Cadets—suggesting that weaknesses in cognitive ability have a greater impact on involuntary separation than do low motivation/commitment (Mowday & Lee, 1986). In the future, we will continue to work with USACC to obtain more detailed ROTC separation codes and comments. This work would provide us greater granularity in distinguishing between voluntary and involuntary separations.

Although the CBEF has consistently shows some level of validity under ARI's program to support ROTC applicant/cadet assessments, it does have some limitations impacting our goal to improve operational validity. Most content scales used in the current operational composite have low but significant correlations with each other (ranging in absolute magnitude from r =.01 to .38), with an average intercorrelation of r = .17. Also, the composite used for selection already includes 5 CBEF content scales that have been very carefully considered for both their

[18] As noted in Chapter 1, scholarship awardees in the "3D" category enter ROTC as freshmen without any type of educational benefit. Their receiving of benefits during their second year is conditional upon their first year performance.

conceptual and empirical evidence.[19] However, we still believe there is value in developing new content in hopes of obtaining practically significant increases in validity.

Finally, another limitation of the CBEF is that the items rely upon an explicit approach to assessment, and some of the items themselves are fairly transparent to the applicants. One might argue that applicants have unconscious motivations that will not be captured in a measure such as the CBEF. In addition, some CBEF items may be subject to some response distortion due to their transparency. However, this concern is attenuated by using our Response Distortion scale, which adjusts scores for respondents that strongly endorse response distortion items. While the CBEF works in high-stakes settings, further advances in faking detection and correction may yield even higher validities in the future.

Future Directions

The anticipated future directions for ARI's ROTC research program include both advances in how the CBEF might be implemented as well as avenues for future research.

CBEF Implementation Issues

As noted earlier in this chapter, the operational CBEF used in the four-year scholarship award process is not optimally weighted relative to the WPS-without CBEF. To better leverage the valid predictive variance in the CBEF composite, a multiple hurdle approach to implementation should be considered. In the first step, the CBEF would be used alone as an initial attrition screen. For example, those applicants scoring among the lowest 20–25% would be eliminated from further consideration. In the second step, USACC could use CBEF in combination with the remaining WPS components to compute an overall candidate order of merit score, *as is currently done*. This approach to selection would likely have a more positive impact on the continuance rates of scholarship awardees who later go on to become cadets. In addition, by reducing the number of candidates who qualify in the first step, significant resources could be saved through the reduced number of interviews and applications required for review by the selection boards.

In September of 2019, USACC implemented ARI's new On-Campus CBEF nationwide. Each year, approximately 2,000 two- and three-year scholarships are awarded to freshman and sophomore cadets who have already enrolled in ROTC, and the new CBEF version is now being used to inform this award decision process. This CBEF is similar to the one used to award four-year scholarships but was designed to predict performance in ROTC. Applicant's scores on the CBEF are combined with other information previously used in the scholarship award process (e.g., selection board scores, GPA, interview, physical fitness test scores), contributing to a "whole person" assessment. We anticipate that the On-Campus CBEF will eventually be used as a tool for supporting other cadet assessment needs (e.g., determining whether a student is offered a seat at Basic Camp, informing branch assignment).

[19] The reader will recall that these scales include Achievement Orientation, Fitness Motivation, Stress Tolerance, Hostility to Authority, and Army Identification. A response distortion scale is also incorporated into the composite.

Avenues for Future Research

Broadly speaking, there are three avenues for future research that might help to significantly exceed the validity limitations currently experienced in our ROTC research. In addition, there is an emerging opportunity to begin examining the relationship between CBEF scores and long-term outcomes well beyond the point of officer commissioning.

Among the approaches for enhancing validity, one involves using the existing CBEF, but applying a new scoring approach. This avenue of investigation has demonstrated that the use of profile similarity metrics (PSMs) can significantly increase the criterion-related validity of CBEF scales relative to the currently used conventional scoring approach (Legree, Ness, et al., 2019; Legree, Purl, et al., 2019). In this method, individual difference scores (against a key) for each applicant are expressed in terms of their shape, elevation, and scatter. These component scores then are optimally weighted to create scale and composite scores for predicting targeted criteria. These investigations have involved ROTC cadets, and the prediction of training and school performance outcomes (OML, APFT scores, and GPA), which is of great importance to USACC. This research is continuing and shows promise for our ability to significantly boost the operational validity of the CBEF.

A second avenue for investigation is to expand the number of constructs that are assessed by the CBEF. For example, we have begun the process of developing items that capture military commitment propensity. This construct appears promising for the purpose of enhancing the prediction of ROTC continuance, although it has received relatively little attention in the research literature. We anticipate that the exploration and testing of new constructs will be ongoing.

Finally, alternative measurement approaches might also be considered in a third avenue for future research. For example, for the reasons described earlier (see previous section), implicit approach to predictor measurement (e.g., a conditional reasoning test) will be considered going forward.

While the initial focus of our research program has been to investigate the validity of the CBEF against relatively short-term outcomes (e.g., ROTC continuance and performance) it is now becoming possible to examine CBEF's validity against relatively long-term post-commissioning outcomes. These include officers' continuance to and beyond their Active Duty Service Obligation (ADSO),[20] as well as performance outcomes such as promotion rates and awards.[21] Because CBEF testing of scholarship applicants under operational conditions began in 2010 (for the 2011/2012 academic year), applicants who were tested at that time could now have reached the point of their four-year ADSO. In addition, cadets who (as rising seniors) first were tested under our annual Summer Advanced Camp testing program in 2010, will have had the opportunity to have served up to 9 years as junior officers. This point in time is well beyond the point of their ADSO, and some within this cohort already will have reached the rank of Major (O4). We are in the process of validating the CBEF against these critical post-commissioning

[20] This obligation is four years for those receiving the four-year national ROTC scholarship and cadets must commit to this service obligation prior to entering their junior year.
[21] Such outcomes are being captured from Army personnel data files on an ongoing basis.

outcomes (including supervisor performance ratings) under a related project focused on the officer branching process (Legree, Purl, et al., 2019). The objective is to extend and expand the utility of the CBEF by creating scales that are more centered on predicting officer performance across and within the Army officer branches. The findings will better inform the optimal use of this measure for enhancing the Army's future officer corps.

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APPENDIX A: MULTI-COHORT DATA FILE

Over the course of the research effort, we have collected data from six annual application cycles and six years of the Cadet Leadership Courses[22] (CLC; formerly referred to as the Leader Development Assessment Course or LDAC). Accordingly, we are more frequently investigating research questions that span multiple applicant or CLC years, which cannot be addressed with a single cohort's data file. Because it is inefficient to create ad hoc data files to address longitudinal research questions, we developed a multi-cohort data file. The multi-cohort data file includes records of those who applied for four-year ROTC scholarships (applicant sample), those who participated in ARI data collection at CLC (CLC sample), and those who received a four-year scholarship, have complete application data, and have at least first year ROTC outcome data (validation sample).

At the outset, ARI and HumRRO described several goals for the multi-cohort data file:

- Intuitive and user-friendly
- House all data central to ROTC Longitudinal Study validation research questions
- Allow item-level analyses of CLC and Applicant CBEF administrations
- Allow test-retest research designs where a single item has been administered to a cadet multiple times
- Keep all records associated with the applicant, CLC, and validation samples

The multi-cohort data file includes data collected from ROTC four-year scholarship applicants who applied for scholarships for the 2010-2011 academic year (F10), the 2011-2012 academic year (F11), the 2012-2013 academic year (F12), the 2013-2014 academic year (F13), the 2014-2015 academic year (F14), and the 2015-2016 academic year (F15). The multi-cohort data file also includes data from cadets who attended CLC between 2010 and 2015. A key goal of the ROTC Longitudinal project also is to track a sub-sample of the records noted above in order to validate the CBEF measure. The validation samples include four-year scholarship awardees who have complete applicant data and have at least one year of outcome data. Accordingly, an overarching focus while building the multi-cohort data file was to track all records as well as the records which comprise the validation samples. A summary of the data coverage is reported for the full sample as well as the validation sample.

To reduce file size and improve accessibility, only variables that are directly applicable to validation research questions were included in the multi-cohort data file. These variables include all item-level CBEF data from both applicant and CLC administrations, CBEF composite and total scores, up to seven years of undergraduate outcome data extracted from USACC student management data records (i.e., cumulative GPA, disenrollment, APFT), and Order of Merit List (OML) data, including CLC/LDAC performance outcomes and OML rank. We updated variable names in many cases to names which are more meaningful between cohorts (e.g., from M10_GPA, where M10 referred to the data extract, to Y1_GPA, where Y1 refers to the undergraduate year). Additionally, we improved filter variables to allow quick parsing of the data file by cohort, CBEF version, validation sample, and scholarship status.

[22] The Cadet Leadership Course was renamed Advanced Camp in 2017.

Approach

We divided the multi-cohort data file development into several steps. Each are described below.

Create a master item-level map. CLC and Applicant CBEF item naming conventions had not been integrated at the outset of the project. As a first step, we created a master item-level map that describes item text, response options, and administration dates/samples.

Rename. The master item-level map was used to rename CBEF variables and outcome data to the new unified naming convention. The renaming was done programmatically using a SAS program.

Examine quality of identification variable. The multi-cohort data file comprises several data files that previously were maintained independently. Accordingly, we needed a single identification variable that could be attained for all data files and which would allow a clean, reliable merge across files. We used Social Security Numbers (SSNs) as the key ID variable for merging and implemented several quality checks to ensure that falsified SSNs were not included in the merge.

Table A1 presents the number of records removed from the multi-cohort file due to unreliable identification variables in the applicant and CLC samples. Table A2 presents the same results for the validation samples. The validation samples only include four-year scholarship awardees who completed applicant data and also have outcome data, as such the sample sizes in Table A2 are expected to be much smaller than those reported in Table A1. Additionally, Tables A1 and A2 report the number of cases removed from the multi-cohort file due to miss-merges. These include two types of miss-merges. The first type of miss-merge includes records that appeared multiple times *within* a single source (e.g., applicant cohort files or CLC cohort files), but did not have the same data represented in the duplicated record. The second type of miss-merge includes records that appeared *across* CLC and applicant cohorts, but the records did not have the same data. These sources of data loss in the multi-cohort file are represented in Tables A1 and A2 as “Within” and “Across” loss, respectively.

Table A1. Data Loss for Applicant and CLC Samples

			Loss			
Historical Cohort	Original	Current	Total Loss	SSN	Within	Across
F10	14,913	10,261	4652	4492	141	19
F11	12,412	11,047	1365	1110	253	2
F12	11,627	11,357	270	12	258	0
F13	11,401	11,115	286	13	273	0
F14	13,321	13,065	256	90	166	0
F15	14,881	14,828	53	45	8	0
CLC 2010	7,769	7,584	185	0	185	0
CLC 2011	6,609	6,232	377	1	365	11
CLC 2012	6,398	6,055	343	1	337	5
CLC 2013	6,048	5,844	204	0	199	5
CLC 2014	5,608	5,532	76	6	70	0

Note. SSN loss category includes unreliable SSNs, blank SSNs or SSNs that evidenced duplicates of a single SSN within a file. For cases where an SSN was duplicated within a data file, only one SSN was retained. *Within* represents the loss due to removing records with duplicate SSNs within a source (applicant or CLC). *Across* represents loss due to removing records with duplicate SSNs across sources (applicant and CLC).

Table A2. Data Loss by Validation Samples

			Loss			
Cohort	Original	Current	Total Loss (pct.)	SSN	Within	Across
F10	705	699	6 (0.86%)	0	1	5
F11	1,329	1,316	13 (0.98%)	0	13	0
F12	949	942	7 (0.74%)	0	7	0
F13	1,267	1,245	22 (1.77%)	0	22	0
Total	4,250	4,202	48 (1.14%)	0	43	5

Note. The validation samples only include four-year scholarship awardees who have complete applicant data and also have at least one year of outcome data. SSN loss category includes unreliable SSNs, blank SSNs or SSNs that evidenced duplicates of a single SSN within a file. For cases where an SSN was duplicated within a data file, only one SSN was retained. *Within* represents the loss due to removing records with duplicate SSNs within a source (applicant or CLC). *Across* represents loss due to removing records with duplicate SSNs across sources (applicant and CLC). Cohorts F14 and F15 are not presented because they were appended to the multi-cohort data file subsequent to the creation of the data file. Accordingly, there are no historical record counts for comparison.

Merge. Using only cases with reliable identification variables, we merged across cohort files in two steps (see Figure A1).

- Within data collection (e.g., F10-F15, CLC 2010-CLC 2015): Duplicated records among cohorts were isolated and removed (see Tables A1-A2).
- Across data collections (i.e., CLC and Applicant): Variable values were compared across CLC and the Applicant data files before combining into the multi-cohort data file. Records with non-identical variable values were isolated and removed (see Tables A1-A2). As an example, if a single SSN record appeared in both the CLC and Applicant DBs, but key parts of their data were inconsistent (e.g., the CLC and Applicant first year disenrollment variable values were not identical), the case was removed from the multi-cohort data file.

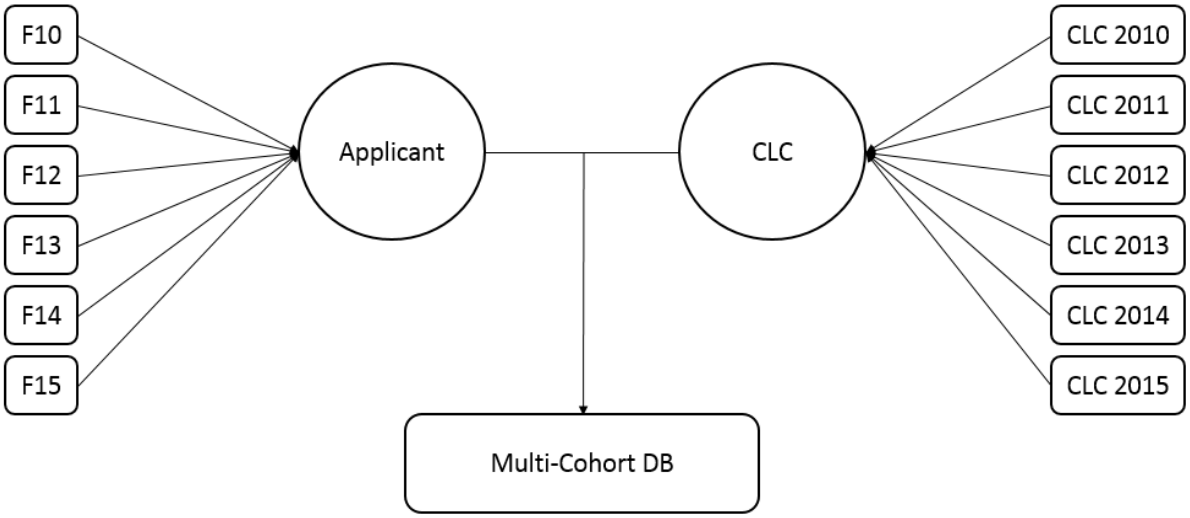

Figure A1. Merge steps for multi-cohort data file.

Quality Control. To ensure the quality of the multi-cohort data file, we tested the data files at each step in the process.

- The item-level map was checked independently by two project members to ensure that the map correctly represented the old and new item naming and content.
- The renaming process was checked via independent calculations of descriptive statistics for variables pre- and post-renaming.
- The reliable identification variable flag was checked to ensure we only removed records that could not be merged reliably.
- Within each merge step, the correspondence of variable content was checked. That is, if data was present on the same case from two different data sources, the variables were verified to be identical before merging.
- Sample sizes were tracked and documented at each stage of the multi-cohort data file development.
- Cohort-level descriptive statistics were verified to be equal using the original data files and the final multi-cohort data file, parsed by cohort filter variables.

Results

The final multi-cohort data file includes a single record for each cadet captured in our applicant (F10-F15) and CLC (2010-2015) samples. Where applicable, each record includes a longitudinal tracking of four-year scholarship application data, USACC student management outcome data, data collected from CLC, and OML data. The multi-cohort data file ensures that all key variables for a cadet is captured in a single data record.

Tables A3 and A4 present frequencies of the data coverage for all records in the multi-cohort data file and for the validation samples by applicant cohort, respectively. In Tables A3 and A4, applicant refers to four-year scholarship applicant data provided by USACC. Note that any

individual who *starts* the application process is included the USACC extracts. The aCBEF column includes counts of any individual who has *completed* the applicant CBEF. The number of applicants with complete CBEF data is typically much smaller than the total number of records included in the USACC Applicant extract. On rare occasions, applicants complete the CBEF instrument, but do not complete the remainder of the application. This discrepancy can result in a total cohort N that is larger than the Applicant N (e.g., note the four-person difference between total n and applicant for cohort f15 in Table A3). The lCBEF and OML columns include counts of cadets who complete the CLC CBEF and are included in the OML extracts, respectively. The SM column includes cadets who have at least one year of outcome data (i.e., APFT scores, cumulative GPA, Disenrollment) extracted from the USACC Student Management data file. The validation sample is discussed in more detail in the next section.

Table A3. Data Coverage for the Multi-Cohort Data File

		Data sources				
Cohort	Total *n*	Applicant	aCBEF	lCBEF	OML	SM
f10	10,261	10,259	2,237	1,981	1,703	799
f11	11,047	10,084	7,276	1,814	1,474	4,149
f12	11,357	11,326	7,720	106	23	3,546
f13	11,115	11,087	7,987	35	1	2,206
f14	13,065	13,040	9,734	3	2	2,579
f15	14,828	14,824	8,724	-	-	-

Note. Applicant denotes the Applicant data extracts, including variables such as the Whole Person Score (WPS). *aCBEF* denotes CBEF item-level and composite data collected from the Applicant CBEF. *lCBEF* denotes item-level and composite-level CBEF data collected during LDAC/CLC administrations. *OML* denotes OML data extracts, including National OML Ranking variables. *SM* denotes outcome data extracts, collected from the Student Management data file.

Table A4. Validation Cohorts' Data Coverage

		Data sources				
Cohort	Total *n*	Applicant	aCBEF	lCBEF	OML	SM
f10	698	698	698	414	356	699
f11	1,316	1,316	1,316	831	688	1,315
f12	942	942	942	610	503	942
f13	1,245	1,245	1,245	0	0	1,245
f14	1,807	1,807	1,807	0	0	1,804
Total	*6,009*	*6,009*	*6,008*	*1,855*	*1,547*	*6,005*

Note. The validation samples only include four-year scholarship awardees who have complete applicant data and also have at least one year of outcome data. Applicant denotes the Applicant data extracts, including variables such as the Whole Person Score (WPS). aCBEF denotes CBEF item-level and composite data collected from the Applicant CBEF. lCBEF denotes item-level and composite-level CBEF data collected during LDAC/CLC administrations. OML denotes OML data extracts, including National OML Ranking variables. SM denotes outcome data extracts, collected from the Student Management data file.

APPENDIX B: PREDICTOR DESCRIPTIVE STATISTICS

Table B1. Descriptive Statistics for Predictors Among Four-Year Scholarship Applicants by Cohort

	F10			F11			F12			F13		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
CBEF Composite Score												
CBEF v1.0	1,499	125.05	39.47	4,644	131.83	38.54	4,635	132.42	37.96	4,759	133.37	37.77
CBEF v2.0	1,499	121.51	38.64	4,644	128.14	36.75	4,635	129.81	37.97	4,759	131.39	37.85
Whole Person Score (WPS)												
Historical WPS without CBEF	1,048	617.87	99.34	3,470	624.17	98.03	3,520	636.71	103.52	3,651	660.95	113.62
Historical WPS + CBEF v1.0	1,048	744.01	109.60	3,463	758.53	108.30	3,517	771.04	114.24	3,647	796.10	125.01
WPS without CBEF	-	-	-	-	-	-	3,512	763.58	113.80	3,651	789.94	123.47
WPS + CBEF v1.0	-	-	-	-	-	-	3,509	897.95	124.93	3,647	925.10	135.34
WPS + CBEF v2.0	-	-	-	-	-	-	3,497	894.89	121.80	3,636	923.44	131.93
WPS Components												
Athlete Points	1,499	29.93	14.25	4,644	31.16	13.46	4,635	31.22	13.44	4,759	31.64	13.69
Board Points	1,499	189.13	54.80	4,644	188.60	50.13	4,635	197.17	55.22	4,759	209.11	62.93
Scholar Points	1,499	17.90	10.00	4,644	18.30	9.99	4,635	18.77	9.95	4,759	20.99	11.44
Leader Points	1,499	30.18	12.14	4,644	30.96	11.59	4,635	31.50	11.35	4,759	33.01	12.55
SAT/ACT	1,499	155.91	33.74	4,644	160.86	31.22	4,635	162.95	31.60	4,759	164.39	32.37
PMS Interview Score	1,499	164.65	35.88	4,644	171.30	32.33	4,635	171.50	32.96	4,759	173.65	32.62
Physical Fitness Assessment	-	-	-	-	-	-	4,621	124.63	26.21	4,759	126.98	24.92
Core CBEF Biodata Scales												
Achievement Orientation (RD-adjusted)	1,499	4.20	.40	4,644	4.23	.39	4,635	4.24	.38	4,759	4.25	.38
Army Identification (RD-adjusted)	1,499	4.05	.50	4,644	4.12	.46	4,635	4.14	.47	4,759	4.15	.45
Fitness Motivation (RD-adjusted)	1,499	3.79	.61	4,644	3.88	.58	4,635	3.86	.58	4,759	3.89	.58
Hostility to Authority (RD-adjusted) [a]	1,499	1.58	.38	4,644	1.54	.37	4,635	1.52	.36	4,759	1.49	.35
Stress Tolerance (RD-adjusted)	1,499	3.40	.38	4,644	3.42	.39	4,635	3.38	.39	4,759	3.39	.39
Response Distortion [a]	1,499	.09	.16	4,644	.08	.14	4,635	.09	.16	4,759	.10	.17
Experimental CBEF Biodata Scales												
Coachability	-	-	-	-	-	-	4,635	3.93	.59	4,759	3.97	.57
Equity Sensitivity	-	-	-	-	-	-	4,635	2.38	.48	4,759	2.35	.49
Goal Orientation	-	-	-	-	-	-	-	-	-	-	-	-
Instrumentality of ROTC Funding	1,499	3.95	.83	4,644	3.85	.86	-	-	-	-	-	-
Instrumentality of Army to Career Goals	1,499	2.94	.71	4,644	2.95	.70	-	-	-	-	-	-
Interest in Leadership	-	-	-	-	-	-	4,635	4.10	.55	4,759	4.12	.54
Manipulativeness [a]	1,499	2.24	.42	4,644	2.25	.42						
Peer Leadership	-	-	-	-	-	-	4,635	3.92	.58	4,759	3.95	.58
Past Withdrawal Propensity [a]	1,499	1.87	.39	4,644	1.86	.39						
Self-Efficacy	1,499	4.38	.41	4,644	4.40	.39	4,635	4.38	.39	4,759	4.38	.39
Tolerance for Injury	1,499	3.71	.61	4,644	3.75	.59	-	-	-	-	-	-
Written Communication	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

Table B1. (Continued)

	F14			F15			F16		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
CBEF Composite Score									
CBEF v1.0	4,298	131.57	38.16	4,129	131.58	38.62	4,598	132.78	39.45
CBEF v2.0	4,298	129.29	38.79	4,129	129.09	37.45	4,598	128.96	37.39
Whole Person Score (WPS)									
Historical WPS without CBEF	3,386	672.34	105.42	3,282	676.71	103.90	3,621	681.28	105.88
Historical WPS + CBEF v1.0	3,381	806.46	115.36	3,273	810.78	115.59	3,611	812.25	113.95
WPS without CBEF	3,385	801.25	114.18	3,282	806.09	111.09	3,620	809.45	114.38
WPS + CBEF v1.0	3,379	935.37	124.72	3,280	940.07	123.28	3,620	945.12	125.25
WPS + CBEF v2.0	3,371	933.43	121.28	3,273	936.67	120.40	3,610	940.44	122.49
WPS Components									
Athlete Points	4,298	34.51	13.47	4,129	34.84	14.57	4,598	34.93	14.60
Board Points	4,298	214.70	57.03	4,129	215.80	54.97	4,598	217.89	56.12
Scholar Points	4,298	22.75	12.43	4,129	24.14	12.14	4,598	23.87	12.23
Leader Points	4,298	32.51	12.71	4,129	33.76	13.16	4,598	33.85	13.23
SAT/ACT	4,298	165.05	33.23	4,129	165.16	32.72	4,598	166.94	33.93
PMS Interview Score	4,298	174.91	32.11	4,129	174.09	33.43	4,598	176.01	31.65
Physical Fitness Assessment	4,297	127.20	24.50	4,129	127.53	22.80	4,598	126.12	24.32
Core CBEF Biodata Scales									
Achievement Orientation (RD-adjusted)	4,298	4.25	.37	4,129	4.26	.38	4,598	4.26	.39
Army Identification (RD-adjusted)	4,298	4.10	.49	4,129	4.10	.48	4,598	4.11	.49
Fitness Motivation (RD-adjusted)	4,298	3.90	.58	4,129	3.89	.57	4,598	3.88	.58
Hostility to Authority (RD-adjusted) [a]	4,298	1.48	.34	4,129	1.49	.34	4,598	1.49	.33
Stress Tolerance (RD-adjusted)	4,298	3.40	.38	4,129	3.40	.38	4,598	3.42	.38
Response Distortion [a]	4,298	.10	.17	4,129	.10	.16	4,598	.10	.16
Experimental CBEF Biodata Scales									
Coachability	4,298	3.96	.55	20	3.81	.49	-	-	-
Equity Sensitivity	4,297	2.36	.47	-	-	-	-	-	-
Goal Orientation	-	-	-	4,129	4.39	.48	4,598	4.39	.49
Instrumentality of ROTC Funding	-	-	-	-	-	-	-	-	-
Instrumentality of Army to Career	-	-	-	-	-	-	-	-	-
Interest in Leadership	4,297	4.12	.55	4,129	4.13	.54	-	-	-
Manipulativeness [a]							-	-	-
Peer Leadership	4,298	3.95	.56	4,129	3.94	.57	4,598	3.95	.58
Past Withdrawal Propensity [a]				4,129	1.73	.43	4,598	1.75	.43
Self-Efficacy	4,297	4.38	.39	4,129	4.36	.39	4,598	4.39	.39
Tolerance for Injury	-	-	-	4,129	3.60	.65	4,598	3.62	.64
Written Communication	-	-	-	-	-	-	4,598	3.51	.54

Note. Scales listed as *RD-adjusted* are corrected using the Response Distortion scale. All other scales are based on the raw response values.

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B2. Descriptive Statistics for Predictors Among 4R Four-Year Scholarship Recipients by Cohort

	F10			F11			F12			F13		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
CBEF Composite Score												
CBEF v1.0	567	127.30	40.09	993	136.73	36.72	744	146.40	34.84	773	146.76	34.97
CBEF v2.0	567	122.84	39.02	993	129.54	34.92	744	139.57	33.39	773	139.87	35.62
Whole Person Score (WPS)												
Historical WPS without CBEF	432	640.60	80.55	887	696.65	54.45	653	694.47	78.06	675	722.73	79.45
Historical WPS + CBEF v1.0	432	768.02	91.34	887	833.86	66.07	653	841.49	85.71	675	869.72	88.51
WPS without CBEF	-	-	-	-	-	-	653	830.66	81.48	675	860.41	83.12
WPS + CBEF v1.0	-	-	-	-	-	-	653	977.68	89.87	675	1007.40	93.05
WPS + CBEF v2.0	-	-	-	-	-	-	653	970.35	87.66	673	1000.97	90.52
WPS Components												
Athlete Points	567	32.17	13.27	993	36.04	10.61	744	35.17	11.17	773	35.76	11.38
Board Points	567	203.34	48.72	993	231.09	32.98	744	231.45	45.52	773	249.49	47.08
Scholar Points	567	18.60	9.39	993	21.11	8.96	744	20.94	8.73	773	24.00	10.36
Leader Points	567	31.44	10.90	993	34.53	9.39	744	34.61	9.92	773	36.09	11.49
SAT/ACT	567	162.26	30.52	993	179.55	25.48	744	175.54	29.68	773	175.59	28.72
PMS Interview Score	567	176.74	25.14	993	191.25	14.71	744	190.36	16.64	773	190.59	16.27
Physical Fitness Assessment	-	-	-	-	-	-	744	135.56	17.27	773	137.11	15.46
Core CBEF Biodata Scales												
Achievement Orientation (RD-adjusted)	567	4.22	.39	993	4.32	.35	744	4.35	.33	773	4.35	.33
Army Identification (RD-adjusted)	567	4.06	.52	993	4.11	.47	744	4.25	.42	773	4.25	.42
Fitness Motivation (RD-adjusted)	567	3.85	.58	993	3.97	.54	744	4.05	.53	773	4.05	.50
Hostility to Authority (RD-adjusted) [a]	567	1.57	.39	993	1.52	.35	744	1.46	.33	773	1.45	.34
Stress Tolerance (RD-adjusted)	567	3.41	.39	993	3.46	.37	744	3.44	.38	773	3.45	.38
Response Distortion [a]	567	.08	.16	993	.07	.13	744	.08	.13	773	.08	.15
Experimental CBEF Biodata Scales												
Coachability	-	-	-	-	-	-	744	3.93	.58	773	3.99	.53
Equity Sensitivity	-	-	-	-	-	-	744	2.35	.47	773	2.31	.48
Goal Orientation	-	-	-	-	-	-	-	-	-	-	-	-
Instrumentality of ROTC Funding	567	3.93	.83	993	3.72	.87	-	-	-	-	-	-
Instrumentality of Army to Career Goals	567	2.94	.71	993	2.88	.68	-	-	-	-	-	-
Interest in Leadership	-	-	-	-	-	-	744	4.18	.54	773	4.22	.50
Manipulativeness [a]	567	2.25	.42	993	2.24	.42	-	-	-	-	-	-
Peer Leadership	-	-	-	-	-	-	744	4.02	.57	773	4.03	.53
Past Withdrawal Propensity [a]	567	1.85	.39	993	1.84	.37	-	-	-	-	-	-
Self-Efficacy	567	4.40	.42	993	4.42	.37	744	4.43	.38	773	4.44	.38
Tolerance for Injury	567	3.75	.60	993	3.76	.59	0			0		
Written Communication	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

Table B2. (Continued)

	F14			F15			F16		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
CBEF Composite Score									
CBEF v1.0	902	148.03	33.48	858	148.33	33.52	708	144.74	36.69
CBEF v2.0	902	138.08	36.51	858	136.96	35.34	708	145.11	33.07
Whole Person Score (WPS)									
Historical WPS without CBEF	841	755.46	63.87	805	751.48	59.22	680	781.69	51.15
Historical WPS + CBEF v1.0	841	903.10	65.22	803	899.75	60.98	680	926.98	48.04
WPS without CBEF	841	892.80	65.86	805	888.41	60.28	680	919.28	53.18
WPS + CBEF v1.0	841	1040.44	67.62	805	1036.45	62.53	680	1064.43	57.24
WPS + CBEF v2.0	840	1031.29	71.12	803	1025.76	66.81	680	1064.58	49.71
WPS Components									
Athlete Points	902	40.65	11.08	858	41.14	11.01	708	41.30	10.71
Board Points	902	264.47	37.62	858	261.10	32.96	708	276.62	31.48
Scholar Points	902	28.16	10.69	858	28.56	10.24	708	30.00	9.84
Leader Points	902	37.94	10.19	858	38.98	10.19	708	40.22	10.43
SAT/ACT	902	184.49	27.91	858	184.00	27.72	708	196.74	25.53
PMS Interview Score	902	193.79	15.02	858	194.16	11.61	708	194.52	11.04
Physical Fitness Assessment	902	137.03	15.87	858	136.78	14.79	708	137.23	15.17
Core CBEF Biodata Scales									
Achievement Orientation (RD-adjusted)	902	4.40	.30	858	4.42	.31	708	4.39	.33
Army Identification (RD-adjusted)	902	4.20	.46	858	4.19	.44	708	4.18	.48
Fitness Motivation (RD-adjusted)	902	4.10	.50	858	4.09	.50	708	4.09	.50
Hostility to Authority (RD-adjusted) [a]	902	1.44	.32	858	1.44	.32	708	1.41	.31
Stress Tolerance (RD-adjusted)	902	3.48	.36	858	3.49	.36	708	3.42	.36
Response Distortion [a]	902	.08	.14	858	.09	.15	708	.05	.10
Experimental CBEF Biodata Scales									
Coachability	902	3.98	.54	6	3.67	.70	-	-	-
Equity Sensitivity	902	2.30	.46	-	-	-	-	-	-
Goal Orientation	-	-	-	858	4.43	.46	708	4.39	.47
Instrumentality of ROTC Funding	-	-	-	-	-	-	-	-	-
Instrumentality of Army to Career Goals	-	-	-	-	-	-	-	-	-
Interest in Leadership	902	4.27	.48	858	4.26	.51	-	-	-
Manipulativeness [a]	-	-	-	-	-	-	-	-	-
Peer Leadership	902	4.10	.50	858	4.08	.53	708	4.04	.54
Past Withdrawal Propensity [a]	-	-	-	858	1.64	.41	708	1.71	.41
Self-Efficacy	902	4.45	.35	858	4.46	.36	708	4.42	.35
Tolerance for Injury	0			858	3.68	.62	708	3.65	.64
Written Communication	-	-	-	-	-	-	708	3.61	.50

Note. Scales listed as *RD-adjusted* are corrected using the Response Distortion scale. All other scales are based on the raw response values.
[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B3. Descriptive Statistics and Reliabilities for 4R, 3D, and QE Scholarship Recipients from F10-F16

			4R, 3D, QE			4R			3D			4R vs 3D
	k	*rxx/ryy*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*d*
CBEF Composite Score												
CBEF v1.0	5	.86	9,484	139.88	36.42	5,545	143.12	36.20	3,918	135.29	36.20	**.22**
CBEF v2.0	6	.65	9,484	134.57	36.04	5,545	136.16	35.91	3,918	132.43	36.01	**.10**
Whole Person Score (WPS)												
Historical WPS without CBEF			8,288	700.34	79.60	4,973	725.49	77.17	3,302	662.96	67.22	**.85**
Historical WPS + CBEF v1.0			8,280	840.30	86.47	4,971	869.11	84.72	3,296	797.39	69.16	**.91**
WPS without CBEF			6,621	841.73	83.10	3,654	879.67	75.03	2,964	795.09	67.23	**1.18**
WPS + CBEF v1.0			6,621	983.66	89.62	3,654	1026.71	79.92	2,964	930.74	70.36	**1.27**
WPS + CBEF v2.0			6,608	978.56	88.75	3,649	1019.78	80.01	2,956	927.85	70.75	**1.21**
WPS Components												
Athlete Points			9,485	36.73	12.14	5,545	37.70	11.66	3,919	35.43	12.62	**.19**
Board Points			9,485	234.04	45.04	5,545	246.75	44.87	3,919	216.41	38.66	**.72**
Scholar Points			9,485	24.02	10.76	5,545	24.67	10.56	3,919	23.13	10.97	**.14**
Leader Points			9,485	35.51	10.98	5,545	36.41	10.63	3,919	34.24	11.30	**.20**
SAT/ACT			9,485	172.95	29.97	5,545	180.38	29.18	3,919	162.68	27.82	**.62**
PMS Interview Score			9,485	187.42	19.89	5,545	190.83	16.60	3,919	182.66	22.90	**.42**
Physical Fitness Assessment			7,472	133.25	18.69	3,985	136.75	15.72	3,482	129.25	20.89	**.41**
Core CBEF Biodata Scales												
Achievement Orientation (RD-	9	.74	9,484	4.32	.35	5,545	4.36	.34	3,918	4.26	.36	**.29**
Army Identification (RD-adjusted)	11	.84	9,484	4.17	.46	5,545	4.18	.46	3,918	4.16	.45	.04
Fitness Motivation (RD-adjusted)	8	.80	9,484	3.99	.54	5,545	4.04	.53	3,918	3.92	.55	**.22**
Hostility to Authority (RD-adjusted) [a]	4	.55	9,484	1.48	.34	5,545	1.47	.34	3,918	1.50	.34	**-.08**
Stress Tolerance (RD-adjusted)	11	.68	9,484	3.43	.37	5,545	3.46	.37	3,918	3.41	.37	**.13**
Response Distortion [a]	7	.74	9,484	.08	.15	5,545	.08	.14	3,918	.09	.15	**-.09**
Experimental CBEF Biodata Scales												
Coachability	5	.70	4,000	3.98	.55	2,425	3.97	.55	1,570	3.99	.55	-.04
Equity Sensitivity	9	.70	3,992	2.33	.47	2,419	2.32	.47	1,568	2.34	.48	-.04
Goal Orientation	4	.56	3,480	4.41	.47	1,566	4.41	.47	1,914	4.40	.47	.02
Instrumentality of ROTC Funding	4	.66	2,013	3.80	.86	1,560	3.79	.86	437	3.81	.88	-.02
Instrumentality of Army to Career	2	.68	2,013	2.90	.69	1,560	2.90	.69	437	2.88	.69	.03
Interest in Leadership	6	.79	5,720	4.20	.52	3,277	4.23	.51	2,438	4.16	.53	**.14**
Manipulativeness [a]	7	.67	2,013	2.24	.41	1,560	2.25	.42	437	2.24	.40	.01
Peer Leadership	6	.80	7,472	4.02	.55	3,985	4.06	.53	3,482	3.98	.56	**.15**
Past Withdrawal Propensity [a]	8	.63	5493	1.75	.41	3126	1.76	.40	2351	1.75	.42	.02
Self-Efficacy	6	.78	9,484	4.41	.38	5,545	4.43	.37	3,918	4.38	.39	**.13**
Tolerance for Injury	5	.67	5,493	3.68	.61	3,126	3.71	.61	2,351	3.64	.62	**.11**
Written Communication	7	.73	1,752	3.53	.52	708	3.61	.50	1044	3.48	.53	**.26**

Note. 4R = Traditional four-year scholarship. 3D = 3-year advance designee scholarship. QE = four-year historically black colleges and universities scholarship. WPS = Whole person Score. CBEF = Cadet Background and Experiences Form. *k* = number of items in scale. rxx/ryy = Coefficient alpha. Significant Cohen's *d* values, based on an independent sample *t*-test between the group means, are bolded (two-tailed, $p < .05$).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B4. Descriptive Statistics for 4R, 3D, and QE Scholarship Recipients by Cohort

	F10			F11			F12			F13		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
CBEF Composite Score												
CBEF v1.0	697	128.04	40.15	1,315	135.55	37.42	942	145.92	35.19	1,244	145.42	34.54
CBEF v2.0	697	123.21	39.52	1,315	129.45	35.40	942	138.43	35.21	1,244	138.81	36.26
Whole Person Score (WPS)												
Historical WPS without CBEF	524	636.03	83.77	1,142	685.72	62.20	820	687.90	79.02	1,090	706.69	79.73
Historical WPS + CBEF v1.0	524	764.10	94.05	1,141	822.06	73.78	820	833.98	86.47	1,090	851.93	87.43
WPS without CBEF	-	-	-	-	-	-	820	822.74	82.32	1,090	842.14	84.09
WPS + CBEF v1.0	-	-	-	-	-	-	820	968.83	90.40	1,090	987.38	92.28
WPS + CBEF v2.0	-	-	-	-	-	-	820	961.18	88.91	1,087	981.25	92.43
WPS Components												
Athlete Points	698	31.59	13.55	1,315	35.38	10.82	942	35.04	11.22	1,244	35.70	11.35
Board Points	698	201.72	48.30	1,315	224.44	36.34	942	228.15	45.95	1,244	240.81	47.03
Scholar Points	698	18.48	9.44	1,315	20.69	9.30	942	20.84	8.85	1,244	23.67	10.52
Leader Points	698	31.08	11.29	1,315	33.86	9.96	942	34.45	10.38	1,244	36.26	11.09
SAT/ACT	698	160.78	31.87	1,315	176.82	27.19	942	173.61	29.75	1,244	172.57	28.92
PMS Interview Score	698	175.10	27.13	1,315	189.05	17.28	942	188.67	19.18	1,244	189.15	16.91
Physical Fitness Assessment	-	-	-	-	-	-	942	134.18	18.50	1,244	134.99	17.57
Core CBEF Biodata Scales												
Achievement Orientation (RD-adjusted)	697	4.22	.40	1,315	4.31	.36	942	4.35	.34	1,244	4.33	.33
Army Identification (RD-adjusted)	697	4.07	.52	1,315	4.11	.47	942	4.25	.43	1,244	4.25	.41
Fitness Motivation (RD-adjusted)	697	3.84	.58	1,315	3.94	.54	942	4.04	.53	1,244	4.04	.51
Hostility to Authority (RD-adjusted) [a]	697	1.57	.38	1,315	1.52	.35	942	1.48	.34	1,244	1.46	.34
Stress Tolerance (RD-adjusted)	697	3.42	.38	1,315	3.44	.37	942	3.44	.38	1,244	3.44	.38
Response Distortion [a]	697	.08	.16	1,315	.07	.13	942	.08	.14	1,244	.09	.16
Experimental CBEF Biodata Scales												
Coachability	-	-	-	-	-	-	942	3.94	.58	1,244	4.00	.55
Equity Sensitivity	-	-	-	-	-	-	942	2.34	.48	1,244	2.30	.49
Goal Orientation	-	-	-	-	-	-	-	-	-	-	-	-
Instrumentality of ROTC Funding	698	3.92	.84	1,315	3.74	.87	-	-	-	-	-	-
Instrumentality of Army to Career Goals	698	2.95	.72	1,315	2.87	.68	-	-	-	-	-	-
Interest in Leadership	-	-	-	-	-	-	942	4.18	.55	1,244	4.21	.51
Manipulativeness [a]	698	2.25	.42	1,315	2.24	.41	-	-	-	-	-	-
Peer Leadership	-	-	-	-	-	-	942	4.02	.58	1,244	4.05	.54
Past Withdrawal Propensity [a]	698	1.85	.39	1,315	1.84	.38	-	-	-	-	-	-
Self-Efficacy	697	4.40	.41	1,315	4.42	.37	942	4.43	.38	1,244	4.43	.39
Tolerance for Injury	698	3.74	.60	1,315	3.76	.58	-	-	-	-	-	-
Written Communication	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

Table B4. (Continued)

	F14			F15			F16		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
CBEF Composite Score									
CBEF v1.0	1,806	140.61	34.92	1,728	140.84	35.18	1,752	138.94	37.26
CBEF v2.0	1,806	135.78	35.98	1,728	133.79	35.66	1,752	137.37	34.37
Whole Person Score (WPS)									
Historical WPS without CBEF	1,604	707.39	81.21	1,555	708.80	74.65	1,553	719.13	79.59
Historical WPS + CBEF v1.0	1,604	848.27	86.33	1,550	849.91	80.38	1,551	856.78	81.91
WPS without CBEF	1,603	840.74	85.42	1,555	842.55	77.72	1,553	851.68	83.95
WPS + CBEF v1.0	1,603	981.62	90.99	1,555	983.51	83.69	1,553	991.14	90.69
WPS + CBEF v2.0	1,600	977.09	90.32	1,550	976.56	85.35	1,551	989.38	86.20
WPS Components									
Athlete Points	1,806	37.91	12.12	1,728	38.52	12.51	1,752	38.44	12.27
Board Points	1,806	238.86	45.18	1,728	239.42	39.70	1,752	242.22	45.25
Scholar Points	1,806	25.63	11.28	1,728	26.53	10.67	1,752	26.54	11.04
Leader Points	1,806	35.66	10.69	1,728	37.14	10.57	1,752	36.76	11.79
SAT/ACT	1,806	172.52	29.88	1,728	171.71	29.52	1,752	176.47	31.19
PMS Interview Score	1,806	187.83	20.12	1,728	188.25	18.54	1,752	187.98	20.08
Physical Fitness Assessment	1,805	132.87	19.16	1,728	133.29	18.03	1,752	131.95	19.33
Core CBEF Biodata Scales									
Achievement Orientation (RD-adjusted)	1,806	4.32	.34	1,728	4.33	.34	1,752	4.31	.36
Army Identification (RD-adjusted)	1,806	4.17	.46	1,728	4.17	.45	1,752	4.17	.47
Fitness Motivation (RD-adjusted)	1,806	4.00	.54	1,728	4.00	.54	1,752	3.97	.54
Hostility to Authority (RD-adjusted) [a]	1,806	1.46	.33	1,728	1.47	.33	1,752	1.46	.32
Stress Tolerance (RD-adjusted)	1,806	3.44	.37	1,728	3.44	.37	1,752	3.42	.36
Response Distortion [a]	1,806	.08	.15	1,728	.09	.16	1,752	.07	.13
Experimental CBEF Biodata Scales									
Coachability	1,806	3.98	.54	8	3.75	.61	-	-	-
Equity Sensitivity	1,806	2.34	.46	-	-	-	-	-	-
Goal Orientation	-	-	-	1,728	4.42	.46	1,752	4.40	.47
Instrumentality of ROTC Funding	-	-	-	-	-	-	-	-	-
Instrumentality of Army to Career Goals	-	-	-	-	-	-	-	-	-
Interest in Leadership	1,806	4.20	.51	1,728	4.21	.52	-	-	-
Manipulativeness [a]	-	-	-	-	-	-	-	-	-
Peer Leadership	1,806	4.02	.53	1,728	4.03	.53	1,752	3.98	.56
Past Withdrawal Propensity [a]	-	-	-	1,728	1.68	.42	1,752	1.71	.41
Self-Efficacy	1,806	4.41	.37	1,728	4.41	.38	1,752	4.39	.38
Tolerance for Injury	-	-	-	1,728	3.65	.63	1,752	3.63	.62
Written Communication	-	-	-	-	-	-	1,752	3.53	.52

Note. Scales listed as *RD-adjusted* are corrected using the Response Distortion scale. All other scales are based on the raw response values.
[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B5. Descriptive Statistics for Gender Comparisons Among 4R Scholarship Recipients from F10-F16

	Male			Female			M vs F
	n	*M*	*SD*	*n*	*M*	*SD*	*d*
CBEF Composite Score							
CBEF v1.0	4,494	145.12	35.48	1,050	134.59	37.96	**.29**
CBEF v2.0	4,494	136.87	35.57	1,050	133.16	37.18	**.10**
Whole Person Score (WPS)							
Historical WPS without CBEF	4,027	725.52	75.29	946	725.33	84.72	.00
Historical WPS + CBEF v1.0	4,026	870.85	81.87	945	861.69	95.63	**.11**
WPS without CBEF	2,976	880.99	72.80	678	873.89	83.92	**.09**
WPS + CBEF v1.0	2,976	1029.73	76.87	678	1013.42	91.02	**.20**
WPS + CBEF v2.0	2,974	1021.59	77.41	675	1011.80	90.22	**.12**
WPS Components							
Athlete Points	4,494	37.70	11.35	1,050	37.70	12.93	.00
Board Points	4,494	246.62	44.11	1,050	247.38	47.98	-.02
Scholar Points	4,494	24.56	10.64	1,050	25.16	10.16	-.06
Leader Points	4,494	36.26	10.74	1,050	37.11	10.08	**-.08**
SAT/ACT	4,494	181.32	28.54	1,050	176.38	31.51	**.17**
PMS Interview Score	4,494	190.65	16.53	1,050	191.63	16.88	-.06
Physical Fitness Assessment	3,255	139.10	13.63	730	126.28	19.67	**.86**
Core CBEF Biodata Scales							
Achievement Orientation (RD-adjusted)	4,494	4.33	.34	1,050	4.47	.31	**-.40**
Army Identification (RD-adjusted)	4,494	4.21	.45	1,050	4.04	.49	**.38**
Fitness Motivation (RD-adjusted)	4,494	4.12	.50	1,050	3.67	.49	**.90**
Hostility to Authority (RD-adjusted) [a]	4,494	1.49	.34	1,050	1.38	.32	**.31**
Stress Tolerance (RD-adjusted)	4,494	3.47	.36	1,050	3.39	.39	**.23**
Response Distortion [a]	4,494	.07	.13	1,050	.09	.15	**-.14**
Experimental CBEF Biodata Scales							
Coachability	1,988	3.96	.55	437	3.99	.57	-.06
Equity Sensitivity	1,982	2.33	.47	437	2.26	.45	**.16**
Goal Orientation	1,273	4.42	.46	293	4.39	.49	.04
Instrumentality of ROTC Funding	1,239	3.77	.87	320	3.89	.81	**-.14**
Instrumentality of Army to Career Goals	1,239	2.94	.70	320	2.76	.65	**.26**
Interest in Leadership	2,676	4.22	.51	601	4.28	.52	**-.12**
Manipulativeness [a]	1,239	2.27	.42	320	2.14	.38	**.31**
Peer Leadership	3,255	4.03	.53	730	4.20	.52	**-.33**
Past Withdrawal Propensity [a]	2,512	1.76	.40	613	1.73	.41	.07
Self-Efficacy	4494	4.43	.37	1050	4.44	.38	-.03
Tolerance for Injury	2,512	3.76	.60	613	3.51	.63	**.40**
Written Communication	579	3.58	.50	129	3.75	.51	**-.34**

Note. M-F d = (M_{Male} — M_{Female})/Pooled Male-Female *SD*. 4R = Traditional four-year scholarship. CBEF = Cadet Background and Experiences Form. Bolded values indicate significant differences at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B6. Descriptive Statistics for Gender Comparisons Among 4R, 3D, and QE Scholarship Recipients from F10-F16

	Male			Female			M vs F
	n	*M*	*SD*	*n*	*M*	*SD*	*d*
CBEF Composite Score							
CBEF v1.0	7,578	141.89	36.09	1,905	131.89	36.61	**.28**
CBEF v2.0	7,578	135.28	35.87	1,905	131.76	36.56	**.10**
Whole Person Score (WPS)							
Historical WPS without CBEF	6,581	700.43	78.38	1,707	699.98	84.14	.01
Historical WPS + CBEF v1.0	6,576	842.15	84.95	1,704	833.16	91.78	**.10**
WPS without CBEF	5,277	844.16	80.87	1,344	832.18	90.74	**.14**
WPS + CBEF v1.0	5,277	988.10	87.01	1,344	966.25	97.30	**.24**
WPS + CBEF v2.0	5,271	981.71	86.10	1,337	966.12	97.58	**.18**
WPS Components							
Athlete Points	7,578	36.68	11.87	1,906	36.93	13.16	-.02
Board Points	7,578	233.72	44.65	1,906	235.38	46.54	-.04
Scholar Points	7,578	23.78	10.89	1,906	24.98	10.19	**-.11**
Leader Points	7,578	35.26	11.13	1,906	36.51	10.26	**-.11**
SAT/ACT	7,578	174.15	29.44	1,906	168.20	31.55	**.20**
PMS Interview Score	7,578	186.82	20.04	1,906	189.82	19.14	**-.15**
Physical Fitness Assessment	6,001	136.26	16.17	1,471	121.00	22.81	**.86**
Core CBEF Biodata Scales							
Achievement Orientation (RD-adjusted)	7,578	4.29	.36	1,905	4.43	.31	**-.41**
Army Identification (RD-adjusted)	7,578	4.21	.45	1,905	4.04	.48	**.36**
Fitness Motivation (RD-adjusted)	7,578	4.07	.51	1,905	3.63	.49	**.86**
Hostility to Authority (RD-adjusted) [a]	7,578	1.50	.34	1,905	1.40	.32	**.28**
Stress Tolerance (RD-adjusted)	7,578	3.45	.37	1,905	3.36	.38	**.25**
Response Distortion [a]	7,578	.08	.14	1,905	.10	.16	**-.12**
Experimental CBEF Biodata Scales							
Coachability	3,260	3.97	.55	740	3.98	.55	-.02
Equity Sensitivity	3,252	2.34	.48	740	2.28	.46	**.11**
Goal Orientation	2,750	4.42	.46	730	4.36	.48	**.12**
Instrumentality of ROTC Funding	1,576	3.76	.87	436	3.93	.81	**-.19**
Instrumentality of Army to Career Goals	1,576	2.93	.69	436	2.77	.68	**.24**
Interest in Leadership	4,613	4.19	.52	1,107	4.25	.52	**-.11**
Manipulativeness [a]	1,576	2.27	.42	436	2.14	.38	**.31**
Peer Leadership	6,002	3.99	.55	1,470	4.15	.52	**-.31**
Past Withdrawal Propensity [a]	4,326	1.76	.41	1,166	1.73	.40	**.08**
Self-Efficacy	7578	4.41	.38	1905	4.43	.38	**-.05**
Tolerance for Injury	4,326	3.73	.60	1,166	3.50	.61	**.38**
Written Communication	1,389	3.49	.52	363	3.69	.51	**-.38**

Note. M-F *d* = (M_{Male} — M_{Female})/Pooled Male-Female *SD*. 4R = Traditional four-year scholarship. WPS = Whole person Score. CBEF = Cadet Background and Experiences Form. Bolded values indicate significant differences at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B7. Descriptive Statistics for Racial-Ethnic Comparisons Among 4R Scholarship Recipients from F10-F16

	White, Non-Hispanic			Black, Non-Hispanic			Hispanic			W-B	W-H
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*d*	*d*
CBEF Composite Score											
CBEF v1.0	3,912	143.94	35.46	115	129.15	42.19	377	144.71	36.01	**.41**	-.02
CBEF v2.0	3,912	135.29	35.26	115	122.18	42.06	377	135.56	38.38	**.37**	-.01
Whole Person Score (WPS)											
Historical WPS without CBEF	3,494	721.15	73.74	99	650.70	97.79	312	692.72	83.21	**.95**	**.38**
Historical WPS + CBEF v1.0	3,492	865.50	81.61	99	779.40	110.84	312	838.52	90.90	**1.04**	**.33**
WPS without CBEF	2,437	875.38	71.98	62	797.90	115.73	223	836.04	90.77	**1.06**	**.53**
WPS + CBEF v1.0	2,437	1023.54	76.65	62	934.66	124.07	223	985.47	98.12	**1.14**	**.48**
WPS + CBEF v2.0	2,434	1014.52	77.85	62	924.84	118.07	222	977.16	98.20	**1.13**	**.47**
WPS Components											
Athlete Points	3,912	37.64	11.42	115	34.30	13.26	377	34.35	13.08	**.29**	**.28**
Board Points	3,912	244.76	43.84	115	212.62	50.13	377	228.06	48.03	**.73**	**.38**
Scholar Points	3,912	24.00	10.42	115	24.50	10.54	377	22.89	11.02	-.05	**.11**
Leader Points	3,912	35.96	10.47	115	36.37	12.05	377	34.87	11.11	-.04	.10
SAT/ACT	3,912	179.89	27.59	115	153.19	31.47	377	167.18	30.94	**.96**	**.46**
PMS Interview Score	3,912	190.98	16.17	115	182.43	25.15	377	187.49	20.97	**.52**	**.21**
Physical Fitness Assessment	2,666	136.99	15.49	74	130.74	19.87	264	134.27	18.64	**.40**	**.17**
Core CBEF Biodata Scales											
Achievement Orientation (RD-adjusted)	3,912	4.35	.33	115	4.31	.37	377	4.37	.35	.13	-.04
Army Identification (RD-adjusted)	3,912	4.19	.45	115	4.04	.53	377	4.21	.44	**.33**	-.04
Fitness Motivation (RD-adjusted)	3,912	4.04	.52	115	3.88	.61	377	4.01	.55	**.30**	.05
Hostility to Authority (RD-adjusted) [a]	3,912	1.48	.34	115	1.51	.37	377	1.46	.33	-.08	.06
Stress Tolerance (RD-adjusted)	3,912	3.48	.36	115	3.36	.41	377	3.45	.38	**.32**	.06
Response Distortion [a]	3,912	.08	.14	115	.13	.18	377	.10	.16	**-.39**	**-.14**
Experimental CBEF Biodata Scales											
Coachability	1,932	3.96	.55	51	4.15	.50	210	3.98	.59	**-.35**	-.03
Equity Sensitivity	1,927	2.31	.46	51	2.41	.59	210	2.30	.49	-.20	.02
Goal Orientation	739	4.43	.45	--	--	--	54	4.47	.49	--	-.08
Instrumentality of ROTC Funding	1,246	3.75	.86	--	--	--	113	3.92	.80	--	**-.20**
Instrumentality of Army to Career Goals	1,246	2.91	.69	--	--	--	113	2.90	.74	--	.00
Interest in Leadership	2,642	4.25	.49	74	4.12	.58	263	4.20	.53	**.25**	.11
Manipulativeness [a]	1,246	2.24	.42	--	--	--	113	2.28	.42	--	-.10
Peer Leadership	2,666	4.05	.53	74	4.19	.57	264	4.12	.55	**-.26**	-.12
Past Withdrawal Propensity [a]	1,985	1.75	.40	64	1.83	.45	167	1.78	.38	-.18	-.05
Self-Efficacy	3,912	4.43	.37	115	4.49	.40	377	4.49	.37	-.16	**-.15**
Tolerance for Injury	1,985	3.75	.60	64	3.44	.65	167	3.72	.58	**.52**	.04

Note. W-B d = (M_{White} — M_{Black})/Pooled White-Black *SD.* W-H d = (M_{White} — $M_{Hispanic}$)/Pooled White-Hispanic *SD.* 4R = Traditional four-year scholarship. CBEF = Cadet Background and Experiences Form. Bolded values indicate significant differences at $p < .05$ (two-tailed). Sample sizes less than 50 are not reported.

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B8. Descriptive Statistics for Racial-Ethnic Comparisons Among 4R, 3D, and QE Scholarship Recipients from F10-F16

	White, Non-Hispanic			Black, Non-Hispanic			Hispanic			W-B	W-H
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*d*	*d*
CBEF Composite Score											
CBEF v1.0	6,115	141.03	35.71	263	133.45	39.03	646	141.16	36.19	**.21**	.00
CBEF v2.0	6,115	134.37	35.58	263	124.67	39.51	646	135.58	37.84	**.27**	-.03
Whole Person Score (WPS)											
Historical WPS without CBEF	5,359	701.61	76.44	224	631.61	82.02	535	674.45	78.52	**.91**	**.35**
Historical WPS + CBEF v1.0	5,356	842.93	83.90	224	764.25	90.59	534	816.80	85.95	**.93**	**.31**
WPS without CBEF	4,052	844.85	79.36	174	763.68	91.64	419	809.34	86.01	**1.02**	**.44**
WPS + CBEF v1.0	4,052	988.18	85.41	174	899.76	98.00	419	954.09	93.20	**1.03**	**.40**
WPS + CBEF v2.0	4,046	981.66	85.76	174	890.60	99.72	417	948.74	92.63	**1.05**	**.38**
WPS Components											
Athlete Points	6,115	36.88	11.66	264	34.54	14.03	646	33.65	13.24	**.20**	**.27**
Board Points	6,115	234.96	43.90	264	202.62	44.33	646	220.41	45.07	**.74**	**.33**
Scholar Points	6,115	23.54	10.62	264	23.60	10.90	646	22.78	10.91	-.01	.07
Leader Points	6,115	35.28	10.64	264	35.97	11.29	646	34.37	11.56	-.06	**.09**
SAT/ACT	6,115	174.59	28.14	264	143.07	29.76	646	162.40	30.08	**1.12**	**.43**
PMS Interview Score	6,115	187.97	18.84	264	182.28	26.25	646	185.27	21.87	**.30**	**.14**
Physical Fitness Assessment	4,541	134.19	17.91	202	125.97	24.82	498	131.93	20.30	**.45**	**.12**
Core CBEF Biodata Scales											
Achievement Orientation (RD-adjusted)	6,115	4.31	.35	263	4.35	.36	646	4.33	.35	-.10	-.04
Army Identification (RD-adjusted)	6,115	4.18	.45	263	4.07	.50	646	4.19	.45	**.24**	-.02
Fitness Motivation (RD-adjusted)	6,115	4.00	.53	263	3.90	.61	646	3.96	.55	**.19**	.07
Hostility to Authority (RD-adjusted) [a]	6,115	1.49	.35	263	1.48	.33	646	1.46	.32	.03	**.10**
Stress Tolerance (RD-adjusted)	6,115	3.45	.36	263	3.38	.41	646	3.42	.39	**.20**	**.09**
Response Distortion [a]	6,115	.08	.14	263	.13	.19	646	.10	.16	**-.39**	**-.13**
Experimental CBEF Biodata Scales											
Coachability	3,122	3.96	.55	126	4.14	.55	342	3.98	.58	**-.32**	-.03
Equity Sensitivity	3,116	2.32	.47	126	2.35	.56	341	2.35	.47	-.05	-.08
Goal Orientation	1,426	4.41	.46	75	4.49	.42	157	4.50	.49	-.17	**-.20**
Instrumentality of ROTC Funding	1,573	3.74	.86	63	4.24	.81	148	3.91	.80	**-.58**	**-.19**
Instrumentality of Army to Career Goals	1,573	2.90	.69	63	2.67	.66	148	2.89	.69	**.33**	.02
Interest in Leadership	4,494	4.21	.51	199	4.18	.56	490	4.18	.53	.06	.07
Manipulativeness [a]	1,573	2.24	.41	63	2.19	.42	148	2.27	.43	.12	-.09
Peer Leadership	4,542	4.01	.54	201	4.19	.55	498	4.08	.56	**-.32**	**-.13**
Past Withdrawal Propensity [a]	2,999	1.76	.41	138	1.72	.41	305	1.77	.41	.10	-.01
Self-Efficacy	6,115	4.41	.38	263	4.50	.40	646	4.46	.38	**-.25**	**-.13**
Tolerance for Injury	2,999	3.72	.60	138	3.44	.59	305	3.68	.58	**.48**	.07

Note. W-B d = (M_{White} — M_{Black})/Pooled White-Black *SD.* W-H d = (M_{White} — $M_{Hispanic}$)/Pooled White-Hispanic *SD.* 4R = Traditional four-year scholarship. WPS = Whole person Score. CBEF = Cadet Background and Experiences Form. Bolded values indicate significant differences at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table B9. Sample Correlations Among WPS and CBEF Scales for 4R Scholarship Recipients from F10-F16

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. CBEF v1.0	1.00															
2. CBEF v2.0	**.53**	1.00														
3. Historical WPS without CBEF	.00	.01	1.00													
4. Historical WPS + CBEF v1.0	**.40**	**.25**	**.91**	1.00												
5. WPS without CBEF	**-.08**	**-.06**	**.98**	**.89**	1.00											
6. WPS + CBEF v1.0	**.35**	**.16**	**.87**	**.96**	**.90**	1.00										
7. WPS + CBEF v2.0	**.14**	**.36**	**.88**	**.91**	**.90**	**.91**	1.00									
8. Athlete Points	**.09**	-.01	**.30**	**.30**	**.29**	**.29**	**.25**	1.00								
9. Board Points	.00	.01	**.92**	**.83**	**.90**	**.79**	**.81**	**.20**	1.00							
10. Scholar Points	**.06**	**.08**	**.37**	**.36**	**.31**	**.30**	**.32**	**.12**	**.26**	1.00						
11. Leader Points	**.10**	**.05**	**.28**	**.29**	**.25**	**.27**	**.24**	**.32**	**.17**	**.40**	1.00					
12. SAT/ACT	**-.08**	**-.04**	**.72**	**.61**	**.68**	**.57**	**.59**	**-.07**	**.58**	**.13**	**-.07**	1.00				
13. PMS Interview	**.11**	**.06**	**.54**	**.53**	**.50**	**.48**	**.47**	**.30**	**.43**	**.17**	**.26**	**.14**	1.00			
14. Physical Fitness Assessment	**.12**	**.04**	**.05**	**.09**	**.26**	**.29**	**.25**	**.20**	**.10**	-.02	**.07**	**-.05**	**.12**	1.00		
15. Achievement Orientation (RD-adjusted)	**.56**	**.24**	**.21**	**.41**	**.13**	**.36**	**.22**	**.10**	**.19**	**.13**	**.10**	**.11**	**.18**	-.02	1.00	
16. Army Identification (RD-adjusted)	**.81**	**.58**	**-.12**	**.22**	**-.20**	**.17**	**.06**	-.01	**-.12**	**.04**	**.08**	**-.15**	**.03**	**.05**	**.18**	1.00
17. Fitness Motivation (RD-adjusted)	**.45**	**.13**	**.04**	**.21**	**.06**	**.25**	**.11**	**.29**	**.05**	**-.08**	**.06**	**-.10**	**.13**	**.47**	**.14**	**.24**
18. Hostility to Authority (RD-adjusted) [a]	**-.34**	**-.63**	**-.03**	**-.19**	**.04**	**-.11**	**-.23**	.02	**-.05**	**-.09**	**-.03**	.03	**-.04**	.02	**-.25**	**-.11**
19. Stress Tolerance (RD-adjusted)	**.55**	**-.07**	-.01	**.19**	-.03	**.21**	**-.07**	**.04**	-.02	**-.03**	.01	-.01	.01	**.05**	**.17**	**.19**
20. Response Distortion [a]	.02	**-.45**	**-.10**	**-.09**	**-.11**	**-.09**	**-.28**	.01	**-.08**	-.01	**.03**	**-.14**	-.01	.02	**-.04**	.02
21. Coachability	**.17**	.03	.02	**.08**	.01	**.07**	.02	-.02	.01	**.06**	.01	-.01	.03	**-.06**	**.27**	**.08**
22. Equity Sensitivity	**-.37**	.03	-.03	**-.18**	-.03	**-.17**	-.02	-.02	-.03	**-.06**	**-.05**	.01	-.04	-.02	**-.18**	**-.22**
23. Goal Orientation	**.58**	**.32**	**-.31**	-.02	**-.30**	.04	**-.11**	-.01	**-.31**	.01	**.05**	**-.30**	-.03	.00	**.15**	**.64**
24. Instrumentality of ROTC Funding	**-.09**	**-.08**	**-.16**	**-.18**	-	-	-	**-.06**	**-.13**	.04	**.08**	**-.18**	**-.06**	-	.04	**-.13**
25. Instrumentality of Army to Career Goals	**.35**	**.22**	**-.15**	.03	-	-	-	-.03	**-.11**	-.03	**.06**	**-.18**	**-.06**	-	**-.08**	**.51**
26. Interest in Leadership	**.39**	**.03**	.01	**.18**	.01	**.17**	.03	**.08**	-.01	.01	**.14**	**-.06**	**.09**	.01	**.33**	**.24**
27. Manipulativeness [a]	**-.23**	.05	.01	**-.10**	-	-	-	-.01	.03	-.04	.00	.03	.00	-	**-.12**	**-.08**
28. Peer Leadership	**.39**	.01	.03	**.18**	.03	**.20**	**.04**	**.06**	.00	**.08**	**.21**	**-.06**	**.10**	-.01	**.40**	**.23**
29. Past Withdrawal Propensity [a]	**-.40**	**-.10**	**-.09**	**-.23**	**.09**	**-.11**	.05	**-.18**	**-.08**	**-.06**	**-.11**	**.06**	**-.10**	-.04	**-.25**	**-.25**
30. Self-Efficacy	**.53**	**.03**	**-.03**	**.17**	**-.06**	**.17**	**-.04**	**.08**	**-.03**	.01	**.08**	**-.10**	**.07**	.03	**.45**	**.31**
31. Tolerance for Injury	**.35**	**.08**	**-.11**	.02	**-.12**	**.07**	**-.06**	**.10**	**-.11**	**-.10**	.01	**-.12**	.03	**.06**	.03	**.37**
32. Written Communication	**.25**	.03	**.13**	**.16**	**.11**	**.26**	**.14**	.03	.06	**.15**	**.15**	.03	**.13**	-.02	**.37**	**.09**

(continued)

Table B9. (Continued)

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1. CBEF v1.0																
2. CBEF v2.0																
3. Historical WPS without CBEF																
4. Historical WPS + CBEF v1.0																
5. WPS without CBEF																
6. WPS + CBEF v1.0																
7. WPS + CBEF v2.0																
8. Athlete Points																
9. Board Points																
10. Scholar Points																
11. Leader Points																
12. SAT/ACT																
13. PMS Interview																
14. Physical Fitness Assessment																
15. Achievement Orientation (RD-adjusted)																
16. Army Identification (RD-adjusted)																
17. Fitness Motivation (RD-adjusted)	1.00															
18. Hostility to Authority (RD-adjusted) [a]	-.01	1.00														
19. Stress Tolerance (RD-adjusted)	**.24**	**-.20**	1.00													
20. Response Distortion [a]	**.10**	**-.03**	.01	1.00												
21. Coachability	.00	**-.10**	**.04**	**.12**	1.00											
22. Equity Sensitivity	**-.14**	**.19**	**-.36**	**-.33**	**-.14**	1.00										
23. Goal Orientation	**.16**	**-.15**	**.20**	**.20**	-	-	1.00									
24. Instrumentality of ROTC Funding	**-.07**	-.02	-.04	**.05**	-	-	-	1.00								
25. Instrumentality of Army to Career Goals	**.15**	.00	**.08**	**.14**	-	-	-	-.01	1.00							
26. Interest in Leadership	**.22**	**-.10**	**.21**	**.22**	**.13**	**-.19**	**.29**	-	-	1.00						
27. Manipulativeness [a]	**-.07**	**.29**	**-.29**	**-.42**	-	-	-	.04	**-.08**	-	1.00					
28. Peer Leadership	**.17**	**-.10**	**.21**	**.26**	**.21**	**-.30**	**.24**	-	-	**.61**	-	1.00				
29. Past Withdrawal Propensity [a]	**-.24**	**.22**	**-.29**	**-.27**	-	-	**-.25**	.02	**-.16**	**-.31**	**.37**	**-.28**	1.00			
30. Self-Efficacy	**.33**	**-.16**	**.34**	**.35**	**.18**	**-.35**	**.38**	**.06**	**.08**	**.46**	**-.27**	**.48**	**-.40**	1.00		
31. Tolerance for Injury	**.35**	**.10**	**.17**	**.11**	-	-	**.25**	-.03	**.27**	**.13**	.02	**.13**	**-.19**	**.27**	1.00	
32. Written Communication	**.08**	**-.09**	**.14**	**.11**	-	-	.05	-	-	-	-	**.42**	**-.12**	**.27**	.04	1.00

Note. 4R = Traditional four-year scholarship. WPS = Whole person Score. CBEF = Cadet Background and Experiences Form. APFT = Army Physical Fitness Test. GPA = Grade point average. Dashes indicate data were not available, n = 680-5,545. Bolded Values indicate significance at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

APPENDIX C: CRITERIA DESCRIPTIVE STATISTICS

Table C1. Descriptive Statistics for ROTC and OML Outcomes Among 4R, 3D, QE Scholarship Recipients by Cohort

	F10			F11			F12			F13		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
1st Year Outcomes												
Disenrollment	699	0.25	0.43	1,314	0.21	0.40	942	0.19	0.39	1,243	0.21	0.41
APFT	567	253.04	35.93	1,088	262.03	32.94	766	264.23	33.45	1,010	263.36	34.49
Cumulative GPA	630	2.98	0.64	1,225	3.17	0.58	868	3.16	0.60	1,078	3.17	0.59
2nd Year Outcomes												
Disenrollment	-	.	.	1,315	0.25	0.43	928	0.24	0.43	1,221	0.29	0.45
APFT	8	266.50	25.36	1,153	268.55	31.57	787	269.78	33.48	849	272.74	28.89
Cumulative GPA	488	3.13	0.50	1,227	3.18	0.57	859	3.17	0.58	924	3.20	0.58
3rd Year Outcomes												
Disenrollment	-	.	.	1,304	0.29	0.45	929	0.29	0.45	1,219	0.32	0.47
APFT	8	284.50	12.57	1,198	279.29	32.83	694	281.83	23.45	858	280.61	24.44
Cumulative GPA	444	3.23	0.42	1,217	3.21	0.57	687	3.28	0.58	861	3.29	0.44
4th Year Outcomes												
Disenrollment	690	0.40	0.49	1,303	0.32	0.47	928	0.30	0.46	1,224	0.34	0.47
APFT	612	264.63	34.29	759	275.46	23.79	582	275.94	25.49	742	274.38	27.45
Cumulative GPA	624	3.04	0.65	775	3.31	0.53	609	3.27	0.52	765	3.32	0.40
2014 OML Outcomes												
Cadet OML Rank	59	3,348.47	1,578.58	737	2,158.13	1,478.28	-	-	-			
OMS	402	75.94	8.76	739	76.27	9.76	-	-	-			
2015-2017 OML Outcomes												
Cadet OML Rank	-	-	-	-	-	-	609	2,061.01	1,523.16	606	2,061.07	1,521.18
OMS	-	-	-	-	-	-	609	56.56	13.96	606	57.14	14.13

(continued)

Table C1. (Continued)

	F14			F15			F16		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
1st Year Outcomes									
Disenrollment	1,790	0.19	0.39	1,707	0.17	0.38	1,718	0.17	0.37
APFT	1,542	260.17	36.92	1,474	258.68	37.21	1,508	256.45	36.77
Cumulative GPA	1,659	3.14	0.59	1,612	3.20	0.57	1,623	3.18	0.57
2nd Year Outcomes									
Disenrollment	1,784	0.25	0.43	1,687	0.21	0.40	-	-	-
APFT	1,304	271.46	28.51	1,276	270.43	29.41	-	-	-
Cumulative GPA	1,422	3.22	0.50	1,343	3.27	0.44	-	-	-
3rd Year Outcomes									
Disenrollment	1,791	0.29	0.45	-	-	-	-	-	-
APFT	1,309	277.84	25.41	-	-	-	-	-	-
Cumulative GPA	1,291	3.30	0.41	-	-	-	-	-	-
4th Year Outcomes									
Disenrollment	-	-	-	-	-	-	-	-	-
APFT	-	-	-	-	-	-	-	-	-
Cumulative GPA	-	-	-	-	-	-	-	-	-
2014 OML Outcomes									
Cadet OML Rank	-	-	-	-	-	-	-	-	-
OMS	-	-	-	-	-	-	-	-	-
2015-2017 OML Outcomes									
Cadet OML Rank	833	2,072.65	1,537.90	-	-	-	-	-	-
OMS	833	60.62	14.29	-	-	-	-	-	-

APPENDIX D: VALIDATION RESULTS FOR 4R, 3D, AND QE FOUR-YEAR SCHOLARSHIP RECIPIENTS

Table D1. Sample Correlations Between WPS, CBEF, and Outcomes for 4R, 3D, and QE Scholarship Recipients from F10-F16

	1st year Outcomes			2nd year Outcomes		
	APFT	GPA	Disenroll	APFT	GPA	Disenroll
CBEF Composite Score						
CBEF v1.0	**.07**	-.01	**-.04**	**.06**	-.01	**-.05**
CBEF v2.0	**.05**	.01	**-.07**	**.05**	.02	**-.07**
Whole Person Score (WPS)						
Historical WPS without CBEF	**.14**	**.19**	**-.04**	**.08**	**.18**	**-.05**
Historical WPS + CBEF v1.0	**.15**	**.17**	**-.06**	**.09**	**.16**	**-.06**
WPS without CBEF	**.22**	**.19**	**-.05**	**.15**	**.19**	**-.07**
WPS + CBEF v1.0	**.23**	**.16**	**-.05**	**.15**	**.17**	**-.08**
WPS + CBEF v2.0	**.22**	**.17**	**-.07**	**.14**	**.17**	**-.09**
WPS Components						
Athlete Points	**.15**	.01	**-.06**	**.11**	.02	**-.06**
Board Points	**.15**	**.20**	**-.05**	**.10**	**.18**	**-.05**
Scholar Points	**-.03**	**.06**	**-.04**	**-.03**	**.05**	**-.03**
Leader Points	**.04**	.01	**-.04**	.01	.02	**-.03**
SAT/ACT	**.05**	**.15**	.01	.00	**.13**	.01
PMS Interview Score	**.12**	**.09**	**-.05**	**.04**	**.08**	**-.05**
Physical Fitness Assessment	**.45**	**.06**	**-.09**	**.37**	**.07**	**-.13**
Core CBEF Biodata Scales						
Achievement Orientation (RD-adjusted)	**.05**	**.14**	**-.03**	**.04**	**.12**	**-.03**
Army Identification (RD-adjusted)	-.02	**-.08**	**-.04**	-.01	**-.08**	**-.03**
Fitness Motivation (RD-adjusted)	**.32**	-.01	**-.03**	**.25**	-.01	**-.05**
Hostility to Authority (RD-adjusted) [a]	**-.03**	**-.06**	**.05**	**-.03**	**-.06**	**.06**
Stress Tolerance (RD-adjusted)	.02	**-.04**	.01	.02	**-.03**	-.01
Response Distortion [a]	-.01	-.02	**.02**	-.02	-.01	**.02**
Experimental CBEF Biodata Scales						
Coachability	**-.05**	-.01	-.02	**-.06**	-.02	-.03
Equity Sensitivity	.00	.00	-.01	-.01	.00	-.01
Goal Orientation	**-.06**	**-.11**	**-.03**	**-.08**	**-.16**	-.04
Instrumentality of ROTC Funding	**-.12**	**-.09**	**.06**	**-.14**	**-.09**	**.08**
Instrumentality of Army to Career Goals	.02	**-.05**	.00	**.07**	-.04	-.02
Interest in Leadership	.00	.00	.01	.00	.00	-.01
Manipulativeness [a]	**-.05**	-.03	.01	-.02	-.04	.01
Peer Leadership	**-.03**	.00	.02	**-.05**	.00	.02
Past Withdrawal Propensity [a]	**-.03**	.00	**.04**	-.02	.00	.03
Self-Efficacy	.01	-.01	.02	-.01	**-.03**	.02
Tolerance for Injury	**.04**	**-.08**	.02	**.05**	**-.09**	.03
Written Communication	-.01	**.09**	-.01	-	-	-

(continued)

Table D1. (Continued)

	3rd year Outcomes			4th year Outcomes		
	APFT	GPA	Disenroll	APFT	GPA	Disenroll
CBEF Composite Score						
CBEF v1.0	**.04**	.02	**-.05**	.01	.03	-.02
CBEF v2.0	**.03**	**.04**	**-.08**	-.01	.03	**-.08**
Whole Person Score (WPS)						
Historical WPS without CBEF	**.08**	**.15**	**-.05**	**.12**	**.19**	**-.07**
Historical WPS + CBEF v1.0	**.08**	**.15**	**-.06**	**.11**	**.17**	**-.07**
WPS without CBEF	**.15**	**.16**	**-.08**	**.12**	**.14**	**-.07**
WPS + CBEF v1.0	**.14**	**.15**	**-.09**	**.10**	**.12**	**-.07**
WPS + CBEF v2.0	**.13**	**.15**	**-.10**	**.09**	**.13**	**-.08**
WPS Components						
Athlete Points	**.07**	.02	**-.05**	**.14**	.01	-.02
Board Points	**.09**	**.15**	**-.05**	**.12**	**.18**	**-.07**
Scholar Points	**-.04**	**.05**	**-.03**	**-.04**	.00	-.01
Leader Points	.00	.01	**-.03**	.03	.03	.00
SAT/ACT	.02	**.11**	.01	**.05**	**.15**	-.02
PMS Interview Score	**.04**	**.07**	**-.06**	**.10**	**.13**	**-.08**
Physical Fitness Assessment	**.32**	.04	**-.14**	**.32**	.03	**-.13**
Core CBEF Biodata Scales						
Achievement Orientation (RD-adjusted)	.01	**.13**	**-.04**	.02	**.14**	**-.04**
Army Identification (RD-adjusted)	-.01	-.03	-.03	**-.05**	-.03	.00
Fitness Motivation (RD-adjusted)	**.20**	.02	**-.05**	**.22**	.03	**-.04**
Hostility to Authority (RD-adjusted) [a]	-.02	**-.05**	**.08**	.00	**-.05**	**.08**
Stress Tolerance (RD-adjusted)	.00	**-.04**	.01	-.03	**-.04**	.02
Response Distortion [a]	.01	-.01	.01	.03	.01	.02
Experimental CBEF Biodata Scales						
Coachability	**-.07**	-.03	-.03	**-.08**	-.04	-.03
Equity Sensitivity	.01	-.01	-.01	.00	-.01	-.03
Goal Orientation	-	-	-	-	-	-
Instrumentality of ROTC Funding	**-.11**	**-.09**	**.08**	**-.13**	**-.11**	**.08**
Instrumentality of Army to Career Goals	.06	-.01	-.01	-.03	**-.07**	.04
Interest in Leadership	-.01	.02	.00	.02	.05	.02
Manipulativeness [a]	-.01	-.03	.03	.02	.00	.00
Peer Leadership	**-.06**	.00	**.04**	-.02	.04	**.06**
Past Withdrawal Propensity [a]	-.01	.01	-.02	.03	.01	-.02
Self-Efficacy	-.01	-.02	**.03**	-.02	.01	**.04**
Tolerance for Injury	.00	-.02	.01	.03	-.05	.04
Written Communication	-	-	-	-	-	-

(continued)

Table D1. (Continued)

	Standardized OML Outcomes	
	OMS	OML Rank
CBEF Composite Score		
CBEF v1.0	**.07**	**-.06**
CBEF v2.0	.03	-.02
Whole Person Score (WPS)		
Historical WPS without CBEF	**.24**	**-.22**
Historical WPS + CBEF v1.0	**.25**	**-.22**
WPS without CBEF	**.27**	**-.26**
WPS + CBEF v1.0	**.27**	**-.26**
WPS + CBEF v2.0	**.26**	**-.25**
WPS Components		
Athlete Points	**.04**	-.03
Board Points	**.22**	**-.21**
Scholar Points	.01	.00
Leader Points	.03	-.03
SAT/ACT	**.22**	**-.20**
PMS Interview Score	**.13**	**-.11**
Physical Fitness Assessment	**.20**	**-.19**
Core CBEF Biodata Scales		
Achievement Orientation (RD-adjusted)	**.14**	**-.13**
Army Identification (RD-adjusted)	-.01	.02
Fitness Motivation (RD-adjusted)	**.13**	**-.12**
Hostility to Authority (RD-adjusted) [a]	-.03	.02
Stress Tolerance (RD-adjusted)	.02	-.01
Response Distortion [a]	-.01	.01
Experimental CBEF Biodata Scales		
Coachability	**-.08**	**.08**
Equity Sensitivity	**-.05**	**.05**
Goal Orientation	-	-
Instrumentality of ROTC Funding	**-.13**	**.12**
Instrumentality of Army to Career Goals	-.05	.06
Interest in Leadership	**.06**	**-.06**
Manipulativeness [a]	-.02	.00
Peer Leadership	**.04**	-.04
Past Withdrawal Propensity [a]	-.02	.04
Self-Efficacy	.01	.00
Tolerance for Injury	**.07**	**-.09**
Written Communication	-	-

Note. 4R = Traditional four-year scholarship. 3D = 3-year advance designee scholarship. QE = four-year historically black colleges and universities scholarship. CBEF = Cadet Background and Experiences Form. APFT = Army Physical Fitness Test. GPA = Grade point average. Because OML models change over time, OML outcomes were standardized within Advanced Camp cohort and combined across cohorts. n = 47 - 9415. Bolded values indicate statistical significance at $p < .05$ (two-tailed).
[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table D2. Incremental Validity Results Among 4R, 3D, and QE Scholarship Recipients

		WPS Only	WPS + CBEF v1.0			WPS + CBEF v2.0			WPS + CBEF Scales [a]		
	n	*R*	*R*	*ΔR* [b]	*Adj. ΔR* [b]	*R*	*ΔR* [b]	*Adj. ΔR* [b]	*R*	*ΔR* [c]	*Adj. ΔR* [c]
1st year outcomes											
APFT	5,595	**.225**	**.232**	**.007**	.007	**.229**	**.004**	.004	**.374**	**.149**	.148
GPA	6,065	**.190**	**.193**	**.003**	.002	**.191**	.001	.000	**.243**	**.053**	.050
Disenrollment	6,556	**.047**	**.056**	**.009**	.007	**.083**	**.036**	.036	**.092**	**.045**	.039
2nd year outcomes											
APFT	3,760	**.150**	**.153**	**.003**	.002	**.151**	.001	.000	**.288**	**.138**	.135
GPA	4,063	**.194**	**.197**	**.003**	.002	**.194**	.000	-.001	**.243**	**.049**	.045
Disenrollment	4,983	**.073**	**.083**	**.010**	.008	**.094**	**.021**	.020	**.113**	**.040**	.033
3rd year outcomes											
APFT	2,537	**.149**	**.149**	.000	-.002	**.149**	.000	-.002	**.291**	**.142**	.137
GPA	2,518	**.162**	**.162**	.000	-.002	**.162**	.000	-.002	**.204**	**.042**	.033
Disenrollment	3,466	**.079**	**.087**	**.008**	.005	**.101**	**.022**	.019	**.135**	**.056**	.047
4th year outcomes											
APFT	1,157	**.120**	**.123**	.003	-.004	**.126**	.006	-.001	**.282**	**.162**	.152
GPA	1,205	**.139**	**.139**	.000	-.006	**.139**	.000	-.006	**.189**	**.050**	.031
Disenrollment	1,879	**.069**	**.070**	.001	-.006	**.082**	.013	.008	**.119**	**.050**	.031
*Standardized OML Outcomes**											
Standardized OMS	1,822	**.273**	**.278**	**.005**	.003	**.274**	.000	-.001	**.302**	**.029**	.020
Standardized OML Rank	1,822	**.259**	**.264**	**.005**	.003	**.260**	.001	-.001	**.288**	**.029**	.020

Note. 4R = Traditional four-year scholarship. 3D = 3-year advance designee scholarship. QE = four-year historically black colleges and universities scholarship. WPS = Whole Person Score. CBEF = Cadet Background and Experiences Form. APFT = Army Physical Fitness Test. GPA = Grade point average. Adj ΔR = Increment in estimated population cross-validity. Significance is not indicated for Adj. ΔR values. Negative Adj. ΔR values should be interpreted as 0. Negative Adj. R values are plausible when models contain terms that do not contribute to prediction. WPS includes ACT/SAT, Scholar-Leader-Athlete, PMS Interview, Board Points, and Physical Fitness Assessment. Because OML models change over time, OML outcomes were standardized within Advanced Camp cohort and combined across cohorts. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

[a] CBEF scales include the six scales that are currently included in the CBEF v2.0 composite.

[b] ΔR is based on the difference between the WPS only and the WPS + CBEF composite.

[c] ΔR is based on the difference between the WPS only and the WPS + CBEF scales.

APPENDIX E: ADVANCED CAMP RESULTS FOR 4R SCHOLARSHIP RECIPIENTS

Table E1. Reliability and Sample Descriptive Statistics for CBEF Scales for 4R Scholarship Recipients in the 2015-2017 Advanced Camp Cohorts

	k	*α*	*n*	*M*	*SD*
CBEF Composite v2.0	6	.63	1,765	106.65	43.73
Core CBEF Biodata Scales (unadjusted)					
Achievement Orientation	9	.75	1,765	4.22	.49
Army Identification	11	.84	1,765	4.06	.55
Fitness Motivation	8	.82	1,765	4.00	.63
Hostility to Authority	4	.50	1,765	1.84	.50
Stress Tolerance	10	.69	1,765	3.28	.48
Response Distortion	7	.70	1,765	.08	.14
Core CBEF Biodata Scales (Lie Adjusted)					
Achievement Orientation	-	-	1,765	4.16	.48
Army Identification	-	-	1,765	4.01	.55
Fitness Motivation	-	-	1,765	3.97	.63
Hostility - Social Maturity	-	-	1,765	1.91	.48
Stress Tolerance	-	-	1,765	3.19	.47
Experimental CBEF Biodata Scales					
Aggression [a]	8	.78	610	2.44	.63
Self-Efficacy	6	.75	1,765	4.41	.41
Guilt Proneness	9	.71	562	4.01	.47
Need for Power	9	.72	610	2.67	.51
Oral Communication	11	.72	610	3.99	.40
Past Withdrawal Propensity [a]	8	.61	1,765	2.11	.44
Peer Leadership	6	.81	1,765	3.83	.62
Self-Disclosure	14	.74	610	2.82	.46
Shame Proneness	10	.71	562	2.82	.51
Tolerance for Injury	5	.75	1,765	3.82	.71
Written Communication	7	.77	1,765	3.35	.69

Note. CBEF = Cadet Background and Experiences Form. 4R = Traditional four-year scholarship. k = number of items in the scale. ryy/rxx= Coefficient alpha reliability coefficient. Scales listed as RD-adjusted are corrected using the Response Distortion scale. All other scales are based on the raw response values.

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table E2. Sample Correlations Between CBEF Scales for 4R Scholarship Recipients in the 2015-2017 Advanced Camp Cohorts

		Core CBEF Biodata Scales (unadjusted)							Core CBEF Biodata Scales (Lie Adjusted)				
		1	2	3	4	5	6	7	8	9	10	11	12
1	CBEF Composite v2.0	1.00											
	Core CBEF Biodata Scales (unadjusted)												
2	Achievement Orientation	**.19**	1.00										
3	Army Identification	**.52**	**.24**	1.00									
4	Fitness Motivation	**.06**	**.17**	**.25**	1.00								
5	Hostility to Authority	**-.62**	**-.24**	**-.14**	.03	1.00							
6	Stress Tolerance	**-.22**	**.09**	**.18**	**.30**	**-.16**	1.00						
7	Response Distortion	**-.31**	**.20**	**.12**	**.11**	**-.29**	**.24**	1.00					
	Core CBEF Biodata Scales (Lie Adjusted)												
8	Achievement Orientation	**.27**	**.98**	**.22**	**.14**	**-.18**	.03	-.02	1.00				
9	Army Identification	**.57**	**.21**	**.99**	**.23**	**-.10**	**.15**	-.02	**.22**	1.00			
10	Fitness Motivation	**.09**	**.15**	**.24**	**1.00**	**.05**	**.28**	.04	**.15**	**.24**	1.00		
11	Hostility - Social Maturity	**-.72**	**-.20**	**-.12**	**.05**	**.97**	**-.11**	**-.07**	**-.19**	**-.11**	**.06**	1.00	
12	Stress Tolerance	**-.12**	.02	**.15**	**.27**	**-.07**	**.95**	**-.07**	.04	**.16**	**.28**	**-.09**	1.00
	Experimental CBEF Biodata Scales												
13	Aggression [a]	.03	**-.21**	**.15**	**.12**	**.31**	**-.19**	**-.22**	**-.17**	**.19**	**.14**	**.27**	**-.12**
14	Self-Efficacy	**.05**	**.45**	**.30**	**.37**	**-.11**	**.33**	**.22**	**.41**	**.27**	**.36**	**-.06**	**.27**
15	Guilt Proneness	**.13**	**.30**	**.13**	-.01	**-.28**	.08	**.25**	**.25**	**.09**	-.03	**-.24**	.01
16	Need for Power	.00	.06	**.09**	.06	**.29**	**-.24**	**-.19**	**.10**	**.12**	.08	**.26**	**-.18**
17	Oral Communication	**.09**	**.38**	**.36**	**.20**	**-.19**	**.40**	**.25**	**.33**	**.32**	**.18**	**-.14**	**.32**
18	Past Withdrawal Propensity [a]	**-.23**	**-.25**	**-.44**	**-.18**	**.24**	**-.29**	**-.19**	**-.21**	**-.42**	**-.17**	**.21**	**-.24**
19	Peer Leadership	.05	**.41**	**.30**	**.24**	-.03	**.24**	**.16**	**.39**	**.28**	**.23**	.00	**.19**
20	Self-Disclosure	-.04	.01	**.09**	.00	-.03	**.16**	**.11**	-.02	.07	.00	-.01	**.13**
21	Shame Proneness	**.13**	-.02	**-.16**	**-.27**	**.08**	**-.60**	**-.18**	.02	**-.14**	**-.26**	.05	**-.56**
22	Tolerance for Injury	.01	.03	**.37**	**.50**	**.15**	**.29**	**.05**	.02	**.36**	**.50**	**.17**	**.29**
23	Written Communication	.00	**.41**	**.07**	**.05**	**-.09**	**.17**	**.10**	**.39**	**.06**	.04	**-.07**	**.14**

(continued)

Table E2. (Continued)

		Experimental CBEF Biodata Scales										
		13	14	15	16	17	18	19	20	21	22	23
1	CBEF Composite v2.0											
	Core CBEF Biodata Scales (unadjusted)											
2	Achievement Orientation											
3	Army Identification											
4	Fitness Motivation											
5	Hostility to Authority											
6	Stress Tolerance											
7	Response Distortion											
	Core CBEF Biodata Scales (Lie Adjusted)											
8	Achievement Orientation											
9	Army Identification											
10	Fitness Motivation											
11	Hostility - Social Maturity											
12	Stress Tolerance											
	Experimental CBEF Biodata Scales											
13	Aggression [a]	1.00										
14	Self-Efficacy	-.03	1.00									
15	Guilt Proneness	-	**.17**	1.00								
16	Need for Power	**.36**	.06	-	1.00							
17	Oral Communication	**-.12**	**.48**	-	-.01	1.00						
18	Past Withdrawal Propensity [a]	-.01	**-.29**	**-.28**	.08	**-.35**	1.00					
19	Peer Leadership	-.03	**.51**	**.20**	**.19**	**.62**	**-.24**	1.00				
20	Self-Disclosure	**-.08**	.01	-	**-.08**	**.08**	**-.12**	.02	1.00			
21	Shame Proneness	-	**-.35**	**.09**	-	-	**.18**	**-.21**	-	1.00		
22	Tolerance for Injury	**.26**	**.29**	**-.10**	.06	**.25**	**-.25**	**.24**	.03	**-.18**	1.00	
23	Written Communication	**-.22**	**.27**	**.22**	.00	**.44**	**-.13**	**.39**	-.03	**-.11**	.04	1.00

Note. CBEF = Cadet Background and Experiences Form. 4R = Traditional four-year scholarship. n = 562-1,765. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.

Table E3. Sample Correlations Between Criterion Variables for the 4R Scholarship Recipients in the 2015-2017 Advanced Camp Cohorts

	Standardized OML Outcomes		Fourth-year Outcomes	
	Cadet OML Rank	OMS	APFT	GPA
OML Outcomes				
Cadet OML Rank	**1.00**			
OMS	**-.99**	**1.00**		
Fourth-year outcomes				
APFT	**-.52**	**.52**	**1.00**	
GPA	**-.67**	**.68**	**.26**	**1.00**
Disenrollment	**.14**	**-.14**	**-.11**	**-.31**

Note. 4R = Traditional four-year scholarship. APFT = Army Physical Fitness Test. GPA = Grade point average. n = 920-1,511. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

Table E4. Sample Correlations Between CBEF Scales and Criterion Variables for 4R Scholarship Recipients in the 2015-2017 Advanced Camp Cohorts

	Standardized OML Outcomes		Fourth-year Outcomes		
	Cadet OML Rank	OMS	APFT	GPA	Disenrollment
CBEF Composite v2.0	**-.12**	**.12**	**.07**	**.07**	**-.08**
Core CBEF Biodata Scales (unadjusted)					
Achievement Orientation	**-.34**	**.35**	**.13**	**.38**	-.05
Army Identification	-.02	.02	.02	-.04	**-.08**
Fitness Motivation	**-.28**	**.29**	**.40**	**.07**	-.01
Hostility to Authority	**.13**	**-.13**	-.03	**-.11**	.05
Stress Tolerance	**-.07**	**.07**	.02	.02	-.04
Response Distortion	.01	-.01	.01	-.02	.03
Core CBEF Biodata Scales (Lie Adjusted)					
Achievement Orientation	**-.35**	**.35**	**.13**	**.39**	**-.06**
Army Identification	-.02	.02	.02	-.04	**-.09**
Fitness Motivation	**-.28**	**.29**	**.40**	**.07**	-.01
Hostility - Social Maturity	**.14**	**-.14**	-.03	**-.12**	**.06**
Stress Tolerance	**-.07**	**.07**	.02	.03	-.06
Experimental CBEF Biodata Scales					
Aggression [a]	**.10**	**-.11**	-.07	**-.12**	-.03
Self-Efficacy	**-.15**	**.15**	**.09**	**.14**	-.01
Guilt Proneness	**-.17**	**.18**	**.10**	**.17**	-.02
Need for Power	.04	-.04	.00	-.01	.02
Oral Communication	-.07	.07	.00	.02	-.01
Past Withdrawal Propensity [a]	**.06**	**-.06**	-.03	-.03	.05
Peer Leadership	**-.13**	**.14**	.05	**.09**	-.01
Self-Disclosure	.04	-.05	-.01	**-.09**	-.05
Shame Proneness	.02	-.02	-.02	.01	.04
Tolerance for Injury	**-.09**	**.09**	**.15**	-.05	-.03
Written Communication	**-.16**	**.17**	.03	**.22**	.00

Note. 4R = Traditional four-year scholarship. CBEF = Cadet Background and Experiences Form. APFT = Army Physical Fitness Test. GPA = Grade point average. n = 442-1,510. Bolded values indicate statistical significance at $p < .05$ (two-tailed).
[a] Negatively valanced, such that lower scores indicate more favorable standing on the construct of interest.