

Technical Report 1398

**Research on the Cadet Background and Experience
Form to Support Army ROTC Personnel Assessment
(2019-2020)**

Christopher R. Graves, Editor
Jennifer P. Green, Editor
Human Resources Research Organization

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August 2021



**United States Army Research Institute
for the Behavioral and Social Sciences**

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**U.S. Army Research Institute
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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.

RESEARCH ON THE CADET BACKGROUND AND EXPERIENCE FORM (CBEF) TO SUPPORT ARMY ROTC PERSONNEL ASSESSMENT (2019-2020)

EXECUTIVE SUMMARY

Research Requirement:

Reserve Officers' Training Corps (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 (HS) seniors to become Army officers. The USACC awards approximately 2,000 scholarships to entering ROTC students each year, yet a significant portion of these awardees will eventually leave the program. This disenrollment creates substantial costs to the Army in terms of lost scholarship money (over \$20,000 per student per year), lost training time/resources, and lost opportunities to award scholarships to others who might have otherwise completed the program and become successful officers.

In 2007, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) began a series of 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 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 Outcome Metrics Score (OMS), and performance in the ROTC Summer Advanced Camp. Accordingly, the USACC has used the CBEF operationally in the award of four-year ROTC scholarships for HS 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, HS grade point average). Adding the CBEF to the process has allowed for a more holistic assessment by capturing critical motivational attributes important to both continuance and performance in ROTC—as well as the Army.

The purpose of the current effort was to (a) continue the longitudinal evaluation of the CBEF using both operational and research data, and (b) explore ways to enhance the CBEF's performance in supporting ROTC personnel assessment needs. This document reports the results of activities conducted in support of these objectives from August 2019 to August 2020.

Procedure:

In the current effort we continued our evaluation of CBEF operational data by describing the ROTC 4-year scholarship applicant samples for the 2018/2019 and 2019/2020 academic years and evaluating the validity of the applicant CBEF for the 2018/2019 applicant sample. We also continued our evaluation of CBEF research (i.e., experimental) data by describing the 2019 ROTC Advanced Camp sample and evaluating the validity of the experimental CBEF for that sample. In a secondary task we developed new experimental CBEF scales for administration at a future Advanced Camp.

Findings:

The broad findings from this effort were consistent with past research in the two major areas of investigation. First, with the most currently available data, we continued to find evidence that the scholarship applicant CBEF is a valid predictor of cadet continuance and performance in the ROTC 4-year scholarship program. Although the validity of the applicant CBEF against continuance (or conversely, withdrawal) was low in this high-stakes operational environment, it was shown to have incremental validity relative to the other components that are considered in the scholarship assessment process. Such incremental validity was also found for performance-related outcomes (i.e., Army Physical Fitness test scores and grade point average). The validity evidence regarding disenrollment is an improvement over the weaker relationships observed in the prior year (Baldwin & Young, 2020) and is consistent with prior longitudinal examinations that span multiple cohorts (Bynum & Young, 2020). Other psychometric properties of the applicant CBEF continue to hold up over time, and the correlations of individual scales against conceptually related criteria were generally consistent with past findings.

In the second major area of our investigation, the experimental CBEF administered to over 6,000 cadets at the 2019 Advanced Camp demonstrated small but significant validity against key ROTC performance outcomes. This included the prediction of a global performance indicator considered to be of considerable importance in evaluating ROTC cadets prior to commissioning (i.e., the Outcome Metrics Score, OMS).

Utilization and Dissemination of Findings:

The current research findings provide empirical support for the continued use of the CBEF in selecting ROTC four-year scholars, albeit one that is undergoing continual improvements. Since the timeframe covered in the current report, ARI has created a new HS CBEF composite that demonstrated higher predictive validity against ROTC continuance. Based on those results, the new composite has been implemented and its subsequent performance will be documented in future reporting.

The Assistant Secretary of the Army (Manpower and Reserve Affairs), Deputy Chief of Staff, Army G-1, U.S. Army Cadet Command, U.S. Military Academy, and officer accessions commands across the Department of Defense will reap rewards from this research as it expands the tools used to identify cadets with the most potential for continuance and performance.

RESEARCH ON THE CADET BACKGROUND AND EXPERIENCE FORM (CBEF) TO SUPPORT ARMY ROTC PERSONNEL ASSESSMENT (2019-2020)

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RESEARCH ON THE CADET BACKGROUND AND EXPERIENCE FORM (CBEF) TO SUPPORT ARMY ROTC PERSONNEL ASSESSMENT (2019-2020)

CHAPTER 1: PROJECT BACKGROUND AND OBJECTIVES

Christopher R. Graves (HumRRO), Mark C. Young, Peter J. Legree, and Robert N. Kilcullen (ARI)

Background

The Reserve Officer Training Corps (ROTC), managed by the U.S. Army Cadet Command (USACC), is the primary commissioning source for Army officers. The ROTC produces approximately 70% of the Army's new 2nd Lieutenants annually and roughly half of Army senior leaders who become general officers. The USACC awards approximately 2,000 four-year scholarships annually to encourage highly qualified high school (HS) seniors to become Army officers. However, a significant portion of awardees will ultimately disenroll and leave the program, creating substantial costs to the Army (e.g., lost scholarship money of over \$20,000 per student per year).

In 2007, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) began a series of 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 relevant to cadet/officer performance and service continuance. Previous research findings generally show the CBEF to be a valid predictor of key ROTC training outcomes such as disenrollment, school performance, physical fitness, ranking on the ROTC Outcome Metrics Score (OMS), and performance in the ROTC Summer Advanced Camp. Based upon these findings, the USACC formally integrated the CBEF into the ROTC scholarship award process for HS students beginning in 2012. The award process previously had a heavy emphasis on the evaluation of cognitive skills (SAT/ACT scores, HS grade point average). Adding the HS CBEF 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.

Given the positive outcomes associated with the use of the HS CBEF, ARI developed an on-campus version of the CBEF in 2017 to inform the award of two- and three-year scholarships to cadets who are already enrolled in the ROTC program. The On-Campus CBEF is designed to predict performance in the ROTC program, as opposed to continuance. The On-Campus CBEF was developed based on research data collected from cadets at the ROTC Summer Advanced Camp (2014–2016), in which it demonstrated validity for predicting overall ROTC performance as reflected by the ROTC commissioning Order of Merit List (OML). The On-Campus CBEF requires further validation 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. To this end, 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. We did not receive initial On-Campus CBEF data in time to provide initial results within the current report, but we anticipate evaluating operational data for the On-Campus CBEF during our 2020-2021 research effort.

The current report documents activities that occurred between August 2019 and August 2020 to support the longitudinal evaluation of the HS CBEF using both operational and research data and the exploration of ways to enhance the performance of CBEF for supporting ROTC personnel assessment needs.

Project Objectives and Caveats

Project objectives included: (a) monitoring and refining the content and scoring of CBEF in its HS and On-Campus versions; (b) testing and evaluating the CBEF at Advanced Camp; (c) evaluating the validity evidence of the CBEF for four-year and non-four-year scholarship recipients with pre-commissioning outcomes; and (d) developing and evaluating new experimental biodata scales with potential to incrementally improve the HS CBEF's predictive validity for continuance.

While we were able to accomplish most of these objectives, fallout from the 2019 Coronavirus (COVID-19) pandemic caused the cancellation of 2020 Advanced Camp activities at Fort Knox, KY. This precluded our administration of the Advanced Camp CBEF, but also provided opportunities for accelerating and expanding the program of research. First, we were able to initiate a detailed analysis to evaluate potential changes to the scoring of the HS CBEF to improve the test's validity in predicting applicant continuance and reduce race, ethnicity, and gender subgroup differences in CBEF composite scores. A new operational CBEF composite shows the potential for significant improvement over the current composite and will be evaluated in relation to the freshman 2019 ROTC cadet cohort (F19). Second, we are now able to examine the potential of additional data elements (e.g., entry waiver status, participation in sports activities) to enhance the CBEF's prediction of continuance in the ROTC program. The composite and new data element evaluations will be completed in the coming year.

Organization of the Report

The remaining sections of this report summarize our 2019-2020 efforts, including (a) descriptions of the 2018 and 2019 HS Applicant Samples and the 2019 Advanced Camp Sample, hereafter referred to as the Freshman 2018 (F18), Freshman 2019 (F19), and Leadership 2019 (L19) samples; (b) an evaluation of the validity evidence of the CBEF for four-year scholarship recipients in the F18 sample¹ with pre-commissioning outcomes; and (c) an evaluation of the validity evidence of the CBEF for Advanced Camp outcomes in the L19 sample. Chapter 2 describes the F18, F19, and L19 data collection efforts. Chapters 3 and 4 report criterion-related validity evidence of the HS CBEF composite for the F18 sample and the L19 samples, respectively. Chapter 5 provides a summary of the research activities conducted during between 2019 and 2020 as well as directions for future research. Finally, Appendix A presents a full summary of new CBEF scale development in 2020 for five additional constructs.

¹ At the time of drafting this report, first year outcome data was not available for the F19 sample, thus the only sample for which we could examine the validity evidence of the CBEF in the High School Applicant sample was for those who were applying for a scholarship in their freshman year of 2018 (F18).

CHAPTER 2: DATA COLLECTION OVERVIEW

Martin C. Yu and Christopher R. Graves (HumRRO)

Annually, ARI coordinates with the U.S. Army Cadet Command (USACC) to administer the CBEF to two samples²: the four-year scholarship applicant sample and the Advanced Camp sample. Below, we first describe and provide sample descriptive statistics for the four-year scholarship applicant samples for those applying for a scholarship as Freshmen in the 2018 and 2019 academic years (F18 and F19). Next, we provide the same information for the 2019 Advanced Camp cohort (L19).

F18 and F19 Four-Year Scholarship Applicant Samples

The F18 and F19 scholarship applicant samples consisted of ROTC applicants who had completed the High School (HS) CBEF between June 2017 and February 2018 and June 2018 and February 2019, respectively, as a part of the four-year ROTC scholarship application package. The USACC administers much of the application, including the 91-item CBEF, as an un-proctored, online assessment. In early investigations of the HS CBEF, prior to its operational administrations, ARI identified several response screening-patterns to flag and remove careless responders. Although many of the response screens used for the HS CBEF are common to other testing programs (e.g., flagging respondents with identical consecutive responses), the combination of flags for the HS CBEF are unique to this testing program. Specifically, we removed from substantive analyses any records flagging on the following rules:

- records with greater than 10% of responses invalid (missing or outside the 1 to 5 range);
- records with 50 or more identical consecutive responses (e.g., 2, 2, 2, 2, 2...,2) are invalid;
- records with at least seven examples of 10 or more identical consecutive responses are invalid;
- records with the same response option selected more than 70 times; or
- records with a Mahalanobis distance³ greater than 300, indicating an extreme outlier (Mahalanobis, 1936). Outlier records can affect the mean statistic, which in turn affects several inferential statistics (e.g., effect size estimates). Thus, removing these records mitigates the likelihood of Type I error in subsequent significance tests.

Of the applicants, the above screening rules flagged and screened out 45 (.5%) F18 records and 64 (.6%) F19 records. Table 2.1 presents the gender and racial demographics of the screened samples.

² The new on-campus CBEF sample will be described in this project's 2020-2021 technical report.

³ Mahalanobis distance provides an index of whether an individual record is a multivariate outlier. It accounts for the variance of each variable under consideration as well as the correlations between all variables under consideration and calculates each record's distance in multivariate space from the center. As a general rule, values greater than 300 are flagged as being multivariate outliers.

Table 2.1. F18 and F19 Applicant Sample Demographics

Sample	F18		F19	
	<i>n</i>	%	<i>n</i>	%
<i>Full Sample</i>	9,870	-	9,729	-
<i>Gender</i>				
Female	3,079	31	3,272	34
Male	6,786	69	6,456	66
<i>Ethnicity</i>				
Hispanic	1,336	14	1,413	15
Non-Hispanic	8,534	86	8,315	85
<i>Race</i>				
African American	1,391	14	1,457	15
American Indian	283	3	287	3
Asian/Pacific Islander	1,005	10	885	9
Hispanic	1,336	14	1,413	15
White	7,918	80	7,712	79

Note. The *Full Sample* values denote the number of F18 and F19 four-year applicants that passed the response screens during data processing. The values represent all applicants in each academic year, captured prior to selection or non-selection and subsequent assignment to one of the three scholarship categories if selected. Subgroup sample sizes do not necessarily add up to the full sample size due to missing data. Race was self-report and allowed multiple responses; therefore, the sum of race percentages may exceed 100.

Among these applicants, 5,128 F18 and 5,165 F19 had their application reviewed by the selection board (i.e., boarded applicants⁴) with only 2,681 F18 and 2,586 F19 accepting a scholarship. Among those who accepted scholarships, 2,621 accepted a four-year scholarship in F18, and 2,578 accepted a four-year scholarship in F19. Table 2.2 shows the number of four-year scholarships offered, accepted, declined, and withdrawn for the F18 and F19 Applicant Samples.

The USACC designates the following three scholarships as “four-year scholarship types” and accordingly, selects awardees using the four-year scholarship application process:

- **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 a four-year scholarship that does not pay benefits the first year, pending a one-year validation by the Professor of Military Science (PMS). 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 administratively, and (d) pass the APFT prior to contracting.

⁴ Scholarship applicants who meet GPA, ACT/SAT score, and physical fitness assessment standards, and who take the CBEF, are interviewed by panels of professors of military science. When sufficient interviews have been completed, selection boards review applications (to include CBEF scores) and assign a board score, which represents one component of the WPS.

- **Four-year historically black colleges and universities (HBCU; QE⁵):** A Quality Enrichment Program (QE) scholarship is a four-year scholarship given at HBCU.

Although the HS CBEF is currently a component of the Whole Person Score⁶ (WPS) used to award 4R, 3D, and QE scholarships, ARI originally designed and validated the HS CBEF on 4R scholarship cadets. Therefore, in addition to analyzing the entire scholarship sample, we also analyze the 4R scholarship cadets separately.

Table 2.2. Four-year Scholarships Offered to the F18 and F19 Applicant Samples and Subsequent Candidate Decisions

F18				F19		
Scholarship Code	<i>n</i>	Within Scholarship %	Overall %	<i>n</i>	Within Scholarship %	Overall %
<i>4R</i>						
Accepted	1,194	78	12	1,023	73	11
Offered and Declined	238	16	2	215	15	2
Withdrawn	100	6	2	168	12	2
<i>3D</i>						
Accepted	1,427	83	14	1,555	84	16
Offered and Declined	119	7	1	178	10	2
Withdrawn	181	10	2	118	6	1
<i>QE</i>						
Accepted	0	-	0	0	-	0
Offered and Declined	0	-	0	0	-	0
Withdrawn	0	-	0	0	-	0
<i>Other</i>						
Accepted	18	90	0	8	73	0
Offered and Declined	2	10	0	0	0	0
Withdrawn	0	0	0	3	27	0
<i>No Award</i>	6,591	-	67	6,525	-	67
<i>Total</i>	9,870			9,729		

Note. “Withdrawn” indicates scholarship applications withdrawn from consideration by the Army before an offer decision was made. Applications are usually withdrawn when candidates choose to attend an alternate school or due to application issues.

L19 Advanced Camp Sample

We collected data from cadets about to enter their fourth year of Military Science (MS-IV) coursework at ROTC’s 2019 Advanced Camp conducted at Fort Knox, KY. Advanced Camp is a

⁵ According to USACC, it is up to each school to decide what scholarship code they record, and although the QE scholarship code has been used previously at HBCU, currently all HBCU use one of the other codes for four-year scholarships.

⁶ The WPS is a composite score, made-up of physical, motivational, and cognitive dimensions.

31-day training event conducted to assess cadets' proficiency at basic officer leadership tasks. The 2019 Advanced Camp occurred in May, June, and July 2019 and included eleven regiments, with each rotation including between 525 and 604 cadets. We collected data separately from each regiment, which necessitated eleven data collections. We administered the assessment – a 28-page machine-readable test booklet – on the first full day of Advanced Camp following the routine in-processing activities and briefings. Upwards of 95% of cadets arrive at camp before the first full day of camp. Administering the assessment early in a rotation minimized potential effects of camp experiences on assessment responses. Assessments were administered in a large auditorium during a 90-minute session that began at approximately 7 pm, immediately following an in-brief by USACC's commanding general.

After identifying 186 cadets who did not consent to participate (2.8% non-participation rate), the 2019 Advanced Camp sample (Leadership 2019; L19) consisted of 6,405 cadets. We used the same screening rules described above to flag the L19 CBEF response data. Of the 6,405 cadets, we flagged 156 records due to one or more of these screening rules and excluded them from subsequent analyses. We note that the flagging rate in the Advanced Camp sample is higher than that in the F19 sample. We speculate that this difference exists because we administer the former assessment for research purposes, whereas the latter assessment constitutes a high-stakes test. Table 2.3 presents the gender and racial demographics of this screened sample.

Table 2.3. 2019 Advanced Camp Sample Demographics

Sample	<i>n</i>	%
<i>Full Sample</i>	6,248	-
<i>Gender</i>		
Female	1,579	25
Male	4,612	74
Missing	57	1
<i>Ethnicity</i>		
Hispanic	978	16
Non-Hispanic	5,212	83
Missing	58	1
<i>Race</i>		
African American	869	14
American Indian	113	2
Asian/Pacific Islander	670	11
Hispanic	978	16
White	4,819	77
Missing	164	3

Note. The *Full Sample* denotes the number of records collected during in-person Advanced Camp data collections that passed the response screens during data processing. Race was self-reported and allowed multiple responses; therefore, the sum of race percentages may exceed 100.

CHAPTER 3: EVALUATION OF THE CRITERION-RELATED VALIDITY EVIDENCE FOR THE HIGH SCHOOL CBEF: F18 CADET COHORT

Jennifer P. Green, Nicholas Howald, Angela Lee, and Timothy C. Burgoyne (HumRRO)

This chapter presents criterion-related validity evidence regarding the potential of High School (HS) CBEF composite scores and scales to predict (a) disenrollment, (b) cumulative GPA, and (c) Army Physical Fitness Test (APFT) scores for four-year scholarship recipients who were freshman ROTC cadets in 2018 (F18). We also report on the incremental validity of the HS CBEF beyond a version of the Whole Person Score (WPS) that excludes the HS CBEF. The operational WPS is a composite score that includes five cognitive and physical components and one motivational component, which is the CBEF. As of 2012, the WPS officially incorporated the HS CBEF as one component of the composite score. We describe the WPS in more detail below. Note that we collect outcome data annually for each four-year scholarship recipient cohort, such that the cohort who began ROTC in 2019 (described in Chapter 2), would have first-year outcome data beginning in 2020, to be received by ARI in the Fall of 2020. Currently, the most recent four-year scholarship cohort with first-year outcome data and reported validity analyses is the F18 cohort.

Method

Validation Sample

The “four-year validation sample” included four-year ROTC scholarship recipients (4R and 3D scholarships) that had complete HS CBEF and WPS data, enrolled in ROTC on campus as freshman in 2018, and had first-year ROTC outcomes. The USACC uses the WPS with the HS CBEF to award 4R, 3D, and QE scholarships, however, ARI originally designed and validated the HS CBEF on 4R scholarship cadets because 4R scholarships are the most competitive, and USACC wanted to prioritize them in ARI’s research. Accordingly, we also present and discuss results for 4R cadets, specifically.

Predictor Measures

The USACC uses the WPS composite to rank order scholarship candidates for the award of four-year scholarships. The discussion in this chapter focuses on the following predictors:

- **Whole Person Score:** The WPS reflects six 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) professors of military science (PMS) interview scores; (d) promotion board scores; (e) Physical Fitness Assessment (PFA) scores; and (f) CBEF scores. All components are rescaled and allotted a maximum number of points. The maximum total WPS an applicant can receive is 1,400 points. For the purposes of our analyses, we compute a WPS that did not include the CBEF scores (where scores range from 0-1,150). This allows us to compare the validity of the other WPS components to the CBEF score and examine CBEF’s incremental validity.

- **HS CBEF Composite:** The HS CBEF consists of a set of rationally keyed biodata scales designed to assess temperament constructs hypothesized to relate to cadet and officer retention. We calculate the operational HS CBEF composite as the weighted average of only some HS CBEF scales presented in this report. The operational scoring of the four-year scholarship CBEF (i.e., CBEF v2.0; hereafter referred to as the HS CBEF composite) went into effect in June 2015 (Bynum & Young, 2020). The HS CBEF scales that make up the composite (i.e., used to make scholarship decisions) are “operational” or “scored,” and the HS CBEF scales not included in the operational HS CBEF composite (i.e., not used to make operational decisions) are “experimental” or “unscored.” In this report, we intentionally omit references to which scales contribute to the operational HS CBEF composite score and which scales are experimental due to the sensitivity of this test information. In lieu of presenting this information, we will present HS CBEF composite score analyses and analyses for all scales administered on the HS CBEF (scored and unscored).

Outcome Measures

The ROTC outcome data includes criteria on students that the USACC tracked since they enrolled in ROTC college courses. We capture each of these variables in the fall following a given academic year:

- **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. We identify cadets as disenrolled in the first-year cumulative variable if they disenrolled during their first year and did not start their second year as an ROTC cadet. Unfortunately, the disenrollment data captured from USACC for this sample does not capture disenrollment reason with precision, thus we cannot disentangle voluntary versus involuntary disenrollment.
- **Cumulative Grade Point Average (GPA):** We cumulate college GPA across academic years, including grades for both ROTC and regular (non-ROTC) college courses. GPA is measured on a 0-4 scale with 4 indicating the highest level of academic achievement. For example, first year cumulative GPA includes course grades from all classes in a cadet’s first academic year.
- **Army Physical Fitness Test (APFT):** ROTC cadets complete the APFT 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. Higher scores indicate higher physical ability.

Results

Descriptive Statistics

Descriptive statistics and scale internal consistency (i.e., coefficient alpha, Kuder-Richardson) reliabilities for the predictor measures appear in Table 3.1. We also present the standardized mean differences between the 4R and 3D scholarship types. We interpret effect sizes in this report of the magnitude .10, .30, and .50 as small, medium, and large (Cohen, 1988). Of note,

scores on the Hostility to Authority, Past Withdrawal Propensity, and Response Distortion scales are negatively valenced, such that higher scores reflect greater hostility to authority, greater propensity to quit activities, and greater propensity to distort responses, respectively. Lower scores reflect less hostility to authority, lower propensity to quit activities, and lower propensity to distort responses. Notable descriptive statistics and reliabilities include the following:

- Many HS CBEF scales show acceptable variance and reliability (operationalized here as $r_{xx} \geq .70$). However, about a third of the scales fall below this cut-off for acceptable reliability, including Goal Orientation ($r_{xx} = .53$), Hostility to Authority ($r_{xx} = .52$), Past Withdrawal Propensity ($r_{xx} = .53$), and Stress Tolerance ($r_{xx} = .67$). Though it would be inappropriate to use such scales individually as predictors, the low reliabilities do not exclude their use within a higher reliability composite.
- Consistent with past research, there were large differences between 4R and 3D cadets on WPS with the HS CBEF excluded and WPS plus the HS CBEF composite scores, with 4R cadets significantly higher than 3D cadets. Regarding WPS components, the 4R cadets were significantly higher than 3D cadets on SAT/ACT scores, suggesting that decisions on scholarships were influenced by SAT/ACT scores.
- Across scales, 4R cadets scored significantly higher on Achievement Orientation, Fitness Motivation, Peer Leadership, and Written Communication scales. The 4R cadets also scored significantly lower on Coachability, Hostility to Authority, and Response Distortion.

Table 3.2 presents descriptive statistics for the ROTC outcomes:

- The first-year disenrollment rate for the four-year validation sample was 11%. This first-year disenrollment rate for F18 is slightly lower than the 15% rate in the F17 sample (Baldwin & Young, 2020).
- 4R and 3D cadets differ significantly on two first-year ROTC outcomes, with 4R cadets having higher GPAs and APFT scores.⁷ Disenrollment was not significantly different between 4R and 3D cadets. Historically, the 3D subgroup has had higher withdrawal rates compared to the 4R subgroup (Bynum & Young, 2020). The current finding may be due to sampling error.

⁷ When considering differences in first-year ROTC outcomes between 4R and 3D cadets, it is important to note that 3D cadets, unlike 4R cadets, have yet to receive any benefits from their scholarships.

Table 3.1. Reliability and Descriptive Statistics for WPS and HS CBEF Scales in the F18 Validation Sample

Scale	Four-year (4R + 3D)					4R			3D			4R-3D
	<i>k</i>	<i>ryy/rxx</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>d</i>
HS CBEF Composite Score			2,096	135.81	35.50	979	143.15	33.22	1,117	129.38	36.20	.40
WPS			1,826	852.74	85.01	923	910.16	58.88	903	794.04	65.22	1.87
WPS + HS CBEF			1,825	989.45	89.38	923	1053.36	58.14	902	924.06	65.17	2.10
<i>WPS Components</i>												
Athlete Points			2,025	40.12	10.76	970	42.72	10.01	1,055	37.73	10.87	.48
Board Points			2,095	246.41	44.73	978	274.85	33.33	1,117	221.51	38.11	1.48
Scholar Points			1,934	28.01	8.98	946	30.15	8.82	988	25.96	8.66	.48
Leader Points			2,021	37.37	9.66	964	39.78	9.38	1,057	35.17	9.39	.49
SAT/ACT			2,098	173.10	32.54	980	189.99	29.55	1,118	158.29	27.42	1.12
PMS Interview Score			2,095	188.73	18.47	978	194.23	12.59	1,117	183.91	21.25	.58
Physical Fitness Assessment			2,095	130.98	20.24	979	136.11	15.69	1,116	126.48	22.57	.49
<i>HS CBEF Biodata Scales</i>												
Achievement Orientation	9	.71	2,096	4.37	.37	979	4.42	.33	1,117	4.33	.39	.24
Army Identification	14	.85	2,096	4.16	.46	979	4.17	.46	1,117	4.15	.46	.04
Coachability	5	.72	2,059	3.71	.66	960	3.68	.66	1,099	3.74	.67	-.09
Fitness Motivation	8	.81	2,096	3.98	.56	979	4.05	.52	1,117	3.92	.59	.23
Goal Orientation	4	.53	2,066	4.35	.47	966	4.34	.47	1,100	4.35	.48	-.02
Hostility to Authority ^a	4	.52	2,096	1.37	.34	979	1.35	.32	1,117	1.39	.36	-.13
Locus of Winning	6	.82	2,059	2.73	.84	960	2.80	.88	1,099	2.67	.80	.16
Past Withdrawal Propensity ^a	5	.53	2,096	1.72	.41	979	1.72	.41	1,117	1.72	.41	-.01
Peer Leadership	6	.80	2,096	4.01	.54	979	4.03	.52	1,117	3.98	.56	.10
Response Distortion ^{ab}	7	.74	2,096	.08	.14	979	.06	.11	1,117	.10	.16	-.33
Stress Tolerance	11	.67	2,096	3.50	.40	979	3.49	.38	1,117	3.52	.41	-.07
Written Communication	7	.74	2,096	3.55	.53	979	3.60	.51	1,117	3.50	.55	.20

Note. 4R = Traditional four-year scholarship. 3D = 3-year advanced designee scholarship. According to USACC, all HBCU use other scholarship codes (4R, 3D) for four-year scholarships. The sample for analyses includes only those four-year ROTC scholarship recipients (4R and 3D) who had complete HS CBEF and WPS data, enrolled in ROTC on campus as freshman in 2018, and had first-year ROTC outcomes. CBEF = Cadet Background and Experience Form. WPS = Whole Person Score without the HS CBEF. HS = High School. The HS CBEF Composite score ranges from 0 to 250. The WPS ranges from 0 to 1,150. The WPS + CBEF ranges from 0 to 1,400. *k* = number of items/scales in the composite. *ryy/rxx* = reliability coefficient. Significant Cohen's *d* values, based on an independent sample *t*-test between the group means, are bolded (two-tailed, $p < .05$).

^aNegatively valenced, such that lower scores indicate more favorable standing on the construct of interest. ^bResponse distortion items have a 0-1 response scale. All other CBEF scales have a 1-5 item response scale.

Table 3.2. Descriptive Statistics for First-Year ROTC Outcomes in the F18 Validation Sample

Outcome	Four-year scholarship validation sample			4R			3D			4R-3D
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>d</i>
APFT	1,729	253.66	35.89	874	261.23	31.31	855	245.93	38.54	.44
GPA	1,926	3.28	.54	939	3.31	.57	987	3.24	.51	.14
Disenrollment	2,098	.11	.31	980	.11	.31	1,118	.10	.30	.03

Note. 4R = Traditional four-year scholarship. 3D = 3-year advanced designee scholarship. APFT = Army Physical Fitness Test. GPA = Grade point average. Significant Cohen's *d* values, based on an independent sample *t*-test between the group means, are bolded (two-tailed, $p < .05$).

Predictor Intercorrelations

Table 3.3 shows correlations among the predictor scales. On average, the CBEF demonstrated small to moderate correlations with other CBEF scales (*Min* $r = -.58$, *Max* $r = .63$). The pattern of correlations generally was consistent with a priori expectations. The strongest correlations among the CBEF scales were observed between Army Identification and Goal Orientation ($r = .63$) and Coachability and Locus of Winning ($r = -.58$).

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 the CBEF composite and WPS to determine potential redundancy of the CBEF. As shown in Table 3.3, there was minimal overlap between the CBEF composite scores and the current WPS ($r = -.08$) and WPS components (*Min* $r = -.06$, *Max* $r = .06$).

Table 3.3. Correlations Among Predictors in the F18 Validation Sample

Descriptives				Intercorrelations																							
	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		
1	CBEF Composite Score	2,096	135.81	35.50																							
2	WPS	1,826	852.74	85.01	-.08																						
3	WPS + CBEF	1,825	989.45	89.38	.32	.92																					
<i>WPS Components</i>																											
4	Athlete Points	2,025	40.12	10.76	-.01	.34	.31																				
5	Board Points	2,095	246.41	44.73	-.06	.88	.79	.19																			
6	Scholar Points	1,934	28.01	8.98	.01	.32	.31	.06	.18																		
7	Leader Points	2,021	37.37	9.66	.04	.31	.30	.28	.17	.32																	
8	SAT/ACT	2,098	173.10	32.54	-.06	.67	.61	-.05	.54	.16	.00																
9	PMS Interview Score	2,095	188.73	18.47	.04	.54	.52	.28	.48	.10	.26	.11															
10	Physical Fitness Assessment	2,095	130.98	20.24	.06	.35	.35	.26	.15	.02	.11	.03	.14														
<i>CBEF Biodata Scales</i>																											
11	Achievement Orientation	2,096	4.31	.35	.25	.16	.24	.08	.23	.08	.15	.09	.17	-.04													
12	Army Identification	2,096	4.12	.45	.59	-.09	.14	.02	-.11	.00	.08	-.10	.05	.11	.22												
13	Coachability	2,059	3.71	.66	-.02	-.04	-.05	-.01	.02	-.02	-.02	-.07	.00	-.06	.20	.03											
14	Fitness Motivation	2,096	3.95	.55	.17	.15	.21	.28	.04	-.11	.02	-.04	.15	.54	.13	.31	.01										
15	Goal Orientation	2,066	4.35	.47	.32	-.12	.01	.07	-.14	-.01	.08	-.18	.03	.07	.19	.63	.04	.24									
16	Hostility to Authority ^a	2,096	1.44	.32	-.63	.08	-.17	.04	.03	-.01	-.01	.08	-.02	.06	-.21	-.12	-.04	-.01	-.15								
17	Response Distortion ^{abc}	2,096	.08	.14	-.48	-.07	-.25	.04	-.07	-.01	.00	-.17	.00	-.01	-.06	-.01	.12	.06	.18	.00							
18	Locus of Winning	2,059	2.73	.84	.08	.07	.10	.08	.01	-.01	.04	.07	.06	.13	.03	.10	-.58	.09	.05	.04	-.07						
19	Past Withdrawal Propensity ^a	2,096	1.72	.41	-.07	-.02	-.04	-.16	-.01	-.03	-.07	.09	-.10	-.08	-.24	-.18	-.11	-.24	-.25	.21	-.22	.02					
20	Peer Leadership	2,096	4.01	.54	.03	.09	.09	.10	.09	.08	.26	-.04	.15	.04	.46	.24	.15	.20	.26	-.07	.23	.00	-.25				
21	Stress Tolerance	2,096	3.41	.37	-.05	.09	.06	.05	.05	-.04	.03	.08	.05	.12	.14	.20	-.02	.29	.16	-.19	-.04	.00	-.24	.15			
22	Written Communication	2,096	3.55	.53	-.01	.15	.13	.02	.16	.14	.12	.14	.12	-.05	.39	.15	.10	.08	.14	-.12	.24	.00	-.19	.48	.16		

Note. CBEF = Cadet Background and Experience Form. WPS = Whole Person Score. Scales listed as *lie-adjusted* are corrected using the Response Distortion scale. All other scales are based on the raw response values. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

^aNegatively valenced, such that lower scores indicate more favorable standing on the construct of interest. ^bResponse distortion items have a 0-1 response scale. All other CBEF scales have a 1-5 response scale. ^cResponse distortion scale is used to adjust scores of scales in the composite.

Bivariate Correlations

Table 3.4 presents the correlations between the WPS, HS CBEF, and ROTC outcomes for the combined four-year scholarship validation sample as well as for the subset of 4R scholarship recipients. Notable findings include:

- HS CBEF composite scores exhibited a small but significant correlation with first-year disenrollment ($r = -.09$ in the four-year validation sample; $r = -.08$ in the 4R sample). A previous validity investigation covering validation cohorts from 2014 to 2016 showed a significant relationship between the HS CBEF composite and first-year disenrollment ($r = -.08$; Bynum & Young, 2020). The current relationship is in line with these findings.⁸
- Among the HS CBEF scales, the strongest relationships with first-year disenrollment included Past Withdrawal Propensity ($r = .06$ in the four-year validation sample; $r = .11$ in the 4R sample), Response Distortion ($r = .05$ in the four-year validation sample), and Hostility to Authority ($r = .06$ in the 4R sample).
- The HS CBEF composite scores exhibited a small correlation with APFT ($r = .07$) in the four-year scholarship validation sample, whereas WPS and WPS plus the HS CBEF had relatively larger correlations with APFT ($r = .26$; $r = .28$). Among the scales, Physical Fitness Assessment ($r = .43$) and Fitness Motivation ($r = .32$) had the strongest correlations with APFT.
- WPS with the HS CBEF excluded and WPS plus the HS CBEF were modestly correlated with GPA ($r = .20$; $r = .18$). This relationship is likely driven by Board Points ($r = .21$) and SAT/ACT ($r = .16$) components. The HS CBEF composite scores were not related to GPA ($r = -.02$), but there was a modest negative correlation between GPA and Goal Orientation ($r = -.12$) and Army Identification ($r = -.09$).

⁸ Combining the 4R and 3D subgroups to validate the CBEF against withdrawal introduces a confound that may result in inflated validity. By design (selection method) the 4Rs will have higher CBEF (and WPS) scores. Further, the 4R cadets receive scholarship benefits for their freshman year while the 3D cadets do not. Thus, validity findings may be higher in the full four-year sample compared to looking at the subgroups separately. In the current analyses, there is not an indication that the validities for the full four-year sample are inflated, likely because disenrollment rates were not significantly different between 4R and 3D cadets.

Table 3.4. Correlations between Predictors and Criteria in the F18 Validation Samples

Scale	Four-year validation sample (4R + 3D)			4R		
	APFT	GPA	Disenrollment	APFT	GPA	Disenrollment
HS CBEF Composite Score	.07	-.02	-.09	.05	.04	-.08
WPS	.26	.20	.03	.14	.18	.04
WPS + HS CBEF	.28	.18	.00	.17	.20	-.01
<i>WPS Components</i>						
Athlete Points	.18	.04	.00	.17	.05	-.02
Board Points	.19	.21	.02	.09	.23	.02
Scholar Points	.01	.05	.00	-.01	.04	.00
Leader Points	.03	-.01	-.01	-.02	-.03	-.03
SAT/ACT	.08	.16	.03	-.05	.10	.05
PMS Interview Score	.11	.04	-.04	.02	.07	.00
Physical Fitness Assessment	.43	.02	-.05	.39	.02	-.02
<i>HS CBEF Biodata Scales</i>						
Achievement Orientation	.06	.08	.00	.12	.09	.00
Army Identification	-.01	-.09	-.02	.00	-.09	.00
Coachability	-.06	.00	.03	-.03	.00	.03
Fitness Motivation	.32	-.05	-.02	.28	-.05	.01
Goal Orientation	-.07	-.12	-.03	.00	-.14	-.01
Hostility to Authority ^a	-.01	.02	.04	-.06	.00	.06
Locus of Winning	.08	.03	-.04	.08	.03	-.04
Past Withdrawal Propensity ^a	-.04	.02	.06	-.07	-.02	.11
Peer Leadership	.01	-.01	.00	.03	-.01	-.02
Response Distortion ^{ab}	-.06	-.05	.05	-.01	-.13	.04
Stress Tolerance	.05	-.05	.02	.07	-.07	.02
Written Communication	.01	.06	.04	.02	.07	.04

Note. CBEF = Cadet Background and Experience Form. WPS = Whole Person Score without the CBEF. HS = High School. k = number of items/scales in the composite. r_{yy}/r_{xx} = reliability coefficient. Four-year $n = 1,514 - 2,097$. 4R $n = 824 - 980$. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

^aNegatively valenced, such that lower scores indicate more favorable standing on the construct of interest. ^bResponse distortion items have a 0-1 response scale. All other CBEF scales have a 1-5 item response scale.

Incremental Validity

To evaluate the incremental validity of the HS CBEF beyond the WPS, we computed a series of two-step hierarchical regression models with respect to the criteria of interest. Hellevik (2009) suggests comparable inferences for both linear and logistic regression analyses. Thus, for more parsimonious and interpretable results, we report on linear regression models for all criteria. We regressed scores for each criterion measure onto cadets' WPS without the CBEF, followed by scores on either the (a) HS CBEF composite or (b) individual scored HS CBEF scales in the

second step. We estimated all models using Ordinary Least Squares (OLS) regression. We discuss the results of OLS regression analyses with a focus on R values. We computed cross-validity estimates to adjust the observed R and ΔR for shrinkage using Burket's (1964) formula for population cross-validity. Table 3.5 summarizes the incremental validity of the HS CBEF composite scores above WPS in predicting ROTC outcomes.

Table 3.5. Incremental Validity of HS CBEF Scores beyond WPS

Outcome		WPS Only		WPS + CBEF				WPS + CBEF Scales ^a			
	<i>n</i>	<i>R</i>	<i>R/r_{pb}</i>	<i>R</i>	<i>R/r_{pb}</i>	ΔR^b	$\Delta R/r_{pb}^b$	<i>R</i>	<i>R/r_{pb}</i>	ΔR^c	$\Delta R/r_{pb}^c$
<i>1st year outcomes</i>											
APFT	1,514	.26	.26	.28	.28	.02	.01	.40	.39	.14	.13
GPA	1,686	.20	.20	.20	.19	.00	.00	.24	.22	.04	.03
Disenrollment	1,824	.03	.01	.08	.07	.05	.06	.09	.05	.06	.04
4R											
<i>1st year outcomes</i>											
APFT	824	.14	.13	.17	.16	.03	.03	.35	.33	.21	.20
GPA	883	.18	.17	.20	.19	.02	.02	.27	.24	.09	.07
Disenrollment	923	.04	.01	.09	.06	.05	.05	.11	.03	.07	.02

Note. 4R = Traditional 4-year scholarship. CBEF = Cadet Background and Experience Form. WPS = Whole Person Score without the CBEF. APFT = Army Physical Fitness Test. GPA = Grade point average. R/r_{pb} = Estimated population cross-validity. $\Delta R/r_{pb}$ = Increment in estimated population cross-validity. Significance is not indicated for R/r_{pb} and $\Delta R/r_{pb}$ values. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

^a CBEF scales include the six scales that are currently included in the CBEF 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.

Because of range restriction, the population of four-year scholarship recipients typically has higher WPS and HS CBEF scores and a smaller standard deviation of scores compared to the applicant sample. To estimate the validity in the applicant population from the observed validity in the validation sample, we corrected for the effects of range restriction on WPS and HS CBEF scores. We corrected for indirect range restriction for correlations using the WPS, HS CBEF, and HS CBEF scales because the USACC currently awards scholarships using the WPS plus HS CBEF composite scores.

Table 3.6 summarizes the incremental validity of the HS CBEF composite scores above WPS in predicting ROTC outcomes after correcting for range restriction. These incremental validity analysis results suggest that:

- WPS scores did not predict first-year disenrollment in either sample.
- The HS CBEF composite score added significant gains in the prediction of first-year APFT, and disenrollment in the four-year validation sample and the 4R sample, which are in line with previous results from the F14-F16 cohorts (Bynum & Young, 2020).
- The HS CBEF composite score added significant gains in the prediction of GPA in the 4R sample only. Typically, the HS CBEF composite does not result in gains for predicting GPA in any sample (Baldwin & Young, 2020; Bynum & Young, 2020).

- Adding the scored HS CBEF scales to the OLS model resulted in gains for predicting APFT and GPA in both the four-year and 4R validation samples.
- The HS CBEF scales added significant gains in the prediction of disenrollment in the four-year validation sample (i.e., the combined 4R and 3D cases) only. In the F17 sample (not shown in Table 3.6), the HS CBEF scales did not add significant gains in the prediction of disenrollment for either the four-year or the 4R validation samples (Baldwin & Young, 2020). In the F14-F16 sample, the HS CBEF scales added significant gains in the prediction of disenrollment for both samples (Bynum & Young, 2020).

Table 3.6. Incremental Validity of HS CBEF Scores beyond WPS (Corrected for Range Restriction)

Outcome		WPS Only		WPS + CBEF				WPS + CBEF Scales ^a			
	<i>n</i>	<i>R</i>	<i>R/r_{pb}</i>	<i>R</i>	<i>R/r_{pb}</i>	ΔR^b	$\Delta R/r_{pb}^b$	<i>R</i>	<i>R/r_{pb}</i>	ΔR^c	$\Delta R/r_{pb}^c$
<i>1st year outcomes</i>											
APFT	1,514	.37	.37	.41	.41	.04	.04	.52	.51	.15	.14
GPA	1,686	.26	.26	.26	.26	.00	.00	.30	.29	.04	.03
Disenrollment	1,824	.02	.00	.08	.07	.06	.07	.09	.05	.07	.05
4R											
<i>1st year outcomes</i>											
APFT	824	.35	.35	.47	.47	.12	.12	.58	.57	.23	.22
GPA	883	.41	.41	.53	.53	.12	.12	.57	.56	.16	.15
Disenrollment	923	.01	-.12	.10	.07	.09	.19	.11	.05	.10	.17

Note. 4R = Traditional 4-year scholarship. CBEF = Cadet Background and Experience Form. WPS = Whole Person Score without the CBEF. APFT = Army Physical Fitness Test. GPA = Grade point average. R/r_{pb} = Estimated population cross-validity. $\Delta R/r_{pb}$ = Increment in estimated population cross-validity. Analyses were run using a correlation matrix corrected for direct and indirect range restriction with outcomes. Statistical significance is not indicated for corrected values.

^a CBEF scales include the six scales that are currently included in the CBEF 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.

Operational Validity

Figure 1, Figure 2, and Figure 3 compare differences in first year APFT, GPA, and disenrollment for those scoring in different quintiles on the (a) HS CBEF composite score, (b) WPS only (i.e., with the HS CBEF excluded), and (c) WPS with the HS CBEF. The figures present results for the four-year validation sample and the 4R validation sample, which show:

- A clear pattern emerged when looking at the WPS including the HS CBEF component in the combined validation sample and the 4R sample for APFT and GPA. The same pattern emerged when looking at the WPS with the HS CBEF excluded. The pattern was found:
 - For APFT and GPA, criterion performance generally improved in a linear fashion by WPS plus the HS CBEF percentile groups, such that the top 20% were among the highest performers. Conversely, the bottom 20% were always the lowest performing.
 - Selecting candidates in the top 80% of the WPS including the HS CBEF component would result in higher performance, on average, for APFT and GPA. This differentiation was less clear for disenrollment.

- In general, there was less differentiation among cadets' performance based on the HS CBEF composite percentile scores for APFT and GPA.
- When focusing on first-year disenrollment, the HS CBEF composite percentile scores more clearly differentiated cadets than the WPS plus the HS CBEF or the WPS only percentile groups for the four-year validation sample and the 4R sample.
 - Disenrollment generally decreased in a linear fashion, with more disenrollment among cadets in the bottom 20% compared to those in higher percentile groups. Selecting candidates in the top 80% of the HS CBEF composite would result in less disenrollment, on average.

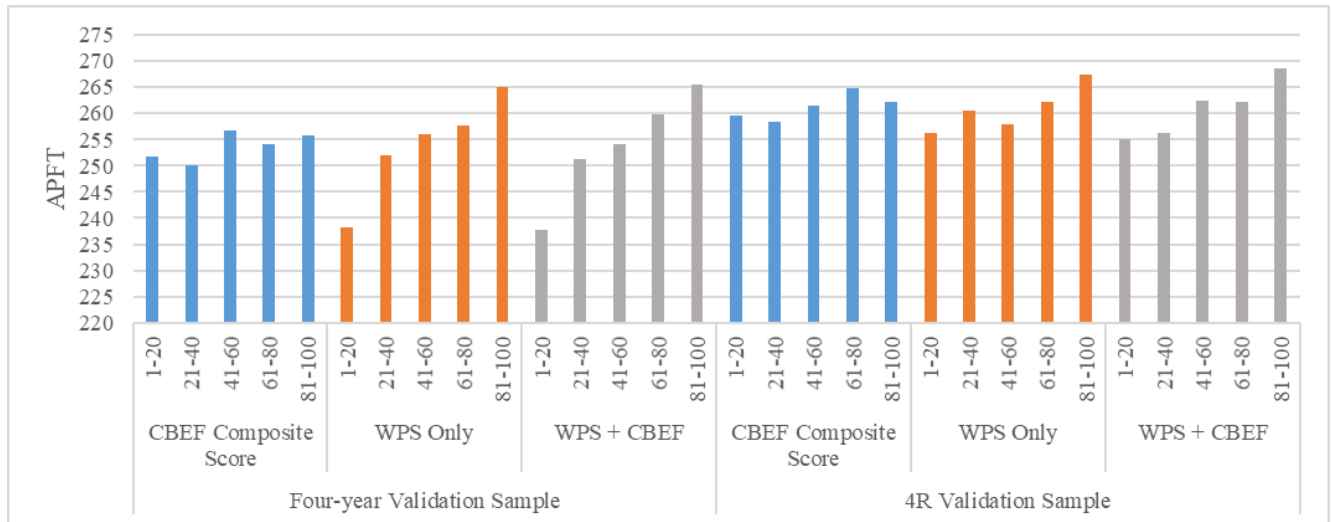


Figure 1. Relationship between the four-year scholarship applicant screens and first-year APFT scores for F18 cadets.

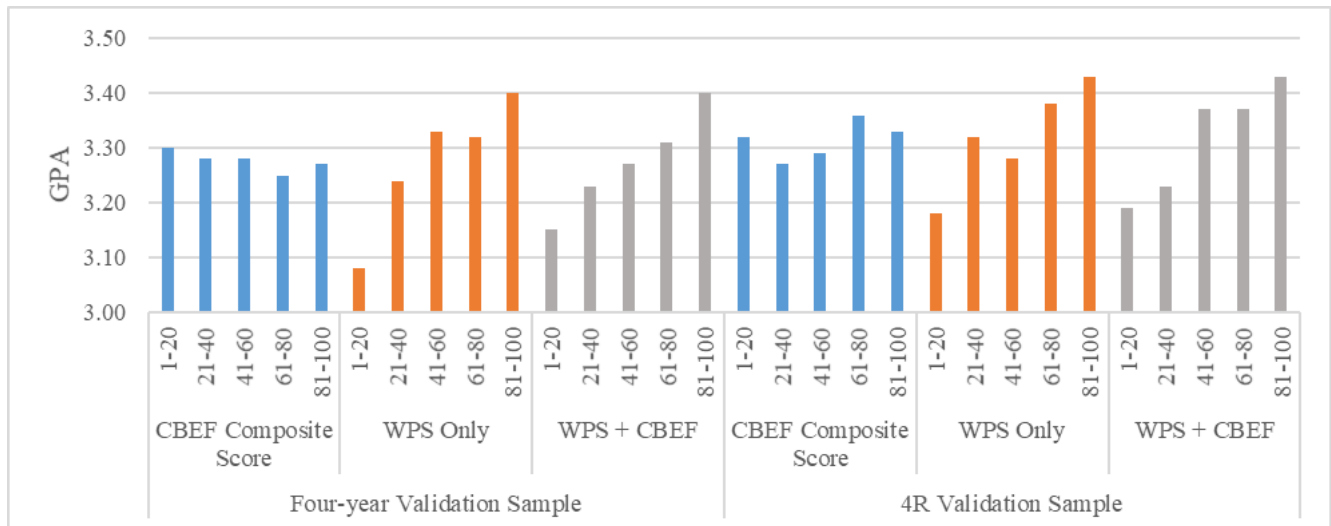


Figure 2. Relationship between the four-year scholarship applicant screens and first-year GPA for F18 cadets.

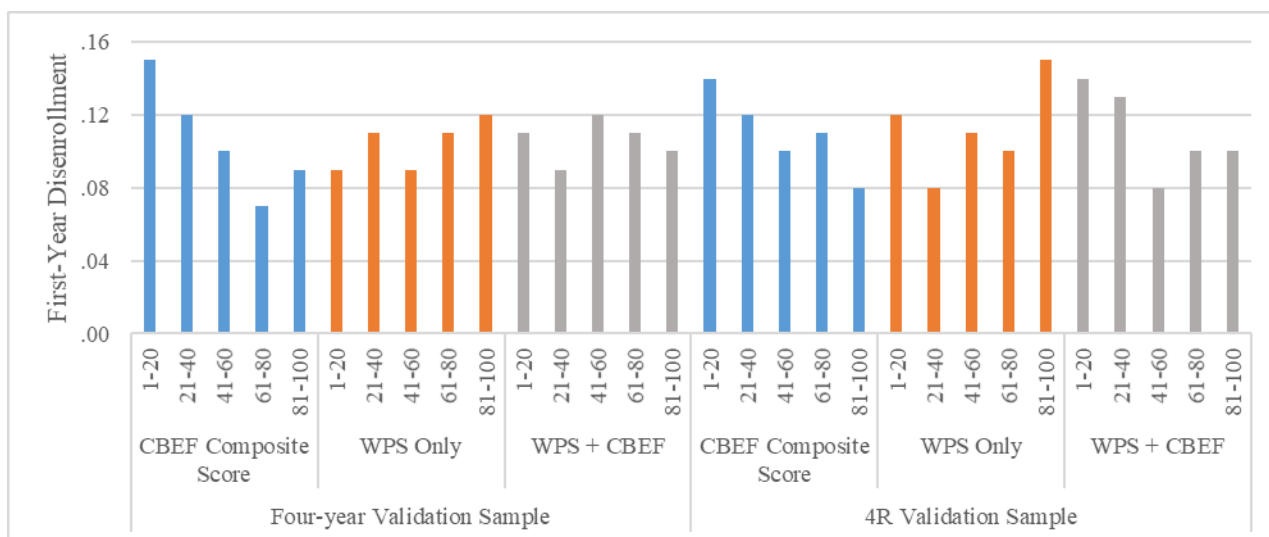


Figure 3. Relationship between the four-year scholarship applicant screens and first-year disenrollment for F18 cadets.

Summary

Overall, the results of the validation analyses suggest that the HS CBEF adds utility for selecting four-year ROTC scholarship recipients. Results demonstrated significant bivariate correlations between the HS CBEF composite and first-year disenrollment and that the HS CBEF score slightly adds to the prediction of first-year disenrollment beyond the WPS. Further, examination of all first-year outcomes and quintile splits of WPS plus the HS CBEF predictor composites showed a clear linear improvement in favor of higher scoring individuals. The effects observed in this research that show significant relationships between the HS CBEF composite and first-year disenrollment are in line with previous longitudinal examinations that span multiple cohorts (Bynum & Young, 2020), and are an improvement compared to weaker relationships between the HS CBEF composite and first year disenrollment observed in the F17 cohort (Baldwin & Young, 2020). However, the similar disenrollment rates for 4R and 3D cadets differs from previous longitudinal examinations. We will continue to monitor the predictive validity of the HS CBEF for future scholarship samples as criterion data become available. Furthermore, the operational HS CBEF is undergoing continual evaluation and refinement. Since the timeframe covered in the current report, ARI created a new HS CBEF composite (CBEF v3.0) that should offer significant improvement over the prior composite (CBEF v2.0). The new composite has been already implemented and future reporting will evaluate its performance in relation to the Freshman 2019 ROTC cadet cohort (F19).

CHAPTER 4: EVALUATION OF 2019 ADVANCED CAMP CBEF DATA

Jennifer P. Green, Timothy C. Burgoyne, Angela Lee, and Nicholas Howald (HumRRO)

This chapter describes the psychometric properties of the Advanced Camp CBEF scales, as well as the key criteria of interest for the 2019 Advanced Camp cohort (Leadership 2019; L19). In our analyses, we compare results for all cadets who attended Advanced Camp, as well as for the subset of 4R scholarship recipients only. These analyses will ultimately inform the use of CBEF scales in future Advanced Camp data collections.

Method

Sample

ROTC cadets typically attend Advanced Camp during the summer of their third collegiate year, prior to their fourth year of military science coursework. The current analyses focus on the L19 cohort. See Chapter 2 for a more detailed description of this sample.

Predictors

Each year we update the Advanced Camp test booklet to include new experimental CBEF scales and to remove scales that are not performing well. For the L19 cohort, predictors included:

- **Scored and Unscored CBEF Scales:** Some CBEF biodata scales are used to compute the High School (HS) CBEF composite score (i.e., “scored” scales) and other scales are experimental scales and not included in the operational HS CBEF composite (i.e., “unscored” scales). The “unscored” scales in the Advanced Camp CBEF differ from the “unscored” scales in the HS CBEF. In this report, we intentionally omit references to which scales contribute to the operational CBEF Composite Score and which scales are experimental due to the sensitivity of this test information. We administered the CBEF scales from the HS CBEF with minor edits to ensure appropriateness for the Advanced Camp sample. We believe these minor edits did not have any substantive effect on the measurement of the underlying constructs. Only a small portion of the Advanced Camp sample (i.e., those who applied for a scholarship) would have completed the HS CBEF prior to entering ROTC. Administering a modified version of the CBEF to all Advanced Camp research participants allowed us to conduct preliminary evaluations of experimental CBEF constructs using a less restricted sample (i.e., not limited to cadets who applied for 4-year scholarships). Though the Advanced Camp study samples and outcomes are not entirely comparable to those of the four-year validation study, the Advanced Camp administration has been the most feasible (i.e., available) method of evaluating new scales under minimally restricted conditions and with a much larger sample than would otherwise be possible.
- **Advanced Camp CBEF Composite:** We computed the CBEF composite score using the HS CBEF composite formula (i.e., CBEF v2.0) with the Advanced Camp CBEF data.

Outcomes

The outcome of interest for the Advanced Camp cohorts is the Outcome Metrics Score (OMS). The OMS is a global ROTC performance composite, combining three broad categories of performance: academic outcomes, leadership outcomes, and physical fitness outcomes. The USACC uses the OMS to rank-order cadets for the Order of Merit List in their senior year within a given cohort. Higher rank (i.e. rank 1) is an indication of higher OMS and higher standing in the cohort.

Results

Predictor Descriptive Statistics and Intercorrelations

Table 4.1 includes reliability estimates, sample sizes, and distributional properties (means and standard deviations) for the CBEF scales in the 2019 Advanced Camp sample. As a reminder, scores on the Hostility to Authority, Response Distortion, and Social Alienation scales are negatively valenced.

- Many Advanced Camp CBEF scales demonstrated sufficient reliability (defined here as $r_{xx} \geq .70$) with the exception of Behavioral Flexibility, Goal Setting, Grit, Hostility to Authority, Informal Learning, Social Alienation (in the sample of all cadets only), and Stress Tolerance (in the 4R scholarship recipient sample only).
- Consistent with past research, mean scores were generally higher for 4R scholarship recipients compared to the sample of all cadets, except for Army Commitment Propensity.

Table 4.2 summarizes the intercorrelations among all 18 CBEF scales for all cadets in the 2019 Advanced Camp cohort. The Advanced Camp CBEF scales exhibited small to moderate intercorrelations. Notable relationships included:

- Achievement Orientation had relatively moderate positive correlations with Goal Setting, Grit, and Self Efficacy ($Min\ r = .43$, $Max\ r = .45$).
- Fitness Motivation had a moderate positive correlation with Tolerance to Injury ($r = .44$).
- Grit had relatively moderate positive correlations with Achievement Orientation, Help Seeking, Oral Communication, Peer Leadership, and Self Efficacy ($Min\ r = .40$, $Max\ r = .53$).
- Oral Communication had relatively moderate positive correlations with Grit, Help Seeking, Peer Leadership, Self Efficacy, and Stress Tolerance ($Min\ r = .41$, $Max\ r = .60$).
- Social Alienation had moderate negative correlations with Oral Communication ($r = -.43$) and Stress Tolerance ($r = -.46$).

Table 4.1. Descriptive Statistics for Advanced Camp CBEF Scales Administered in 2019

Scale	All Cadets					4R Cadets				
	<i>k</i>	<i>ryy/rxx</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>k</i>	<i>ryy/rxx</i>	<i>n</i>	<i>M</i>	<i>SD</i>
CBEF Composite Score			6,178	90.10	44.51			480	99.99	41.11
<i>CBEF Biodata Scales</i>										
Achievement Orientation	9	.72	6,208	3.96	.55	9	.73	483	4.12	.50
Army Identification	11	.82	6,180	3.79	.59	11	.84	480	3.90	.57
Behavioral Flexibility	3		6,237	2.92	.47	3		483	2.96	.39
Fitness Motivation	8	.81	6,213	3.74	.64	8	.83	483	3.95	.62
Goal Setting	12	.47	6,243	3.32	.41	12	.52	483	3.45	.41
Grit	12	.63	6,243	3.65	.44	12	.65	483	3.75	.43
Help Seeking	12	.85	6,242	3.74	.61	12	.86	483	3.75	.58
Hostility to Authority ^a	4	.54	6,208	1.86	.54	4	.48	482	1.90	.49
Informal Learning	12	.62	6,242	3.58	.44	12	.65	483	3.75	.44
Army Commitment Propensity	3	.84	6,237	3.97	1.46	3	.78	483	3.10	1.02
Oral Communication	11	.70	6,245	3.78	.45	11	.71	483	3.87	.42
Peer Leadership	6	.78	6,242	3.66	.62	6	.78	483	3.81	.57
Response Distortion ^{ab}	7	.72	6,243	.11	.17	7	.72	483	.07	.12
Self Efficacy	6	.77	6,242	4.29	.45	6	.77	483	4.34	.42
Social Alienation ^a	5	.68	6,241	2.49	.69	5	.73	483	2.52	.72
Stress Tolerance	11	.70	6,197	3.16	.50	11	.69	481	3.20	.47
Tolerance to Injury	5	.74	6,242	3.58	.78	5	.76	483	3.75	.73
Written Communication	7	.73	6,243	3.21	.66	7	.78	483	3.29	.68

Note. Blank cells indicate that items did not have positive covariances and, therefore, may not form a useful single scale because items are not measuring the same construct. 4R = Traditional 4-year scholarship. CBEF = Cadet Background and Experience Form. The CBEF Composite score ranges from 0 to 250. *k* = number of items/scales in the composite. *ryy/rxx* = reliability coefficient.

^aNegatively valenced, such that lower scores indicate more favorable standing on the construct of interest. ^bResponse distortion items have a 0-1 response scale. All other CBEF scales have a 1-5 item response scale.

Table 4.2. Intercorrelations among Advanced Camp CBEF Scales in the 2019 Advanced Camp Cohort

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Achievement Orientation																		
2 Army Identification	.27																	
3 Behavioral Flexibility	-.03	-.06																
4 Fitness Motivation	.17	.26	-.04															
5 Goal Setting	.45	.26	-.02	.32														
6 Grit	.45	.34	-.08	.33	.36													
7 Help Seeking	.34	.16	-.07	.12	.18	.40												
8 Hostility to Authority ^a	-.22	-.12	.07	.00	-.08	-.26	-.20											
9 Informal Learning	.20	.14	.01	.20	.10	.25	.27	-.06										
10 Army Commitment Propensity	-.04	.33	-.06	.06	-.01	.13	.07	-.09	.06									
11 Oral Communication	.36	.32	-.07	.25	.27	.48	.43	-.18	.35	.11								
12 Peer Leadership	.39	.30	-.07	.24	.31	.42	.31	-.03	.26	.03	.60							
13 Response Distortion ^{ab}	.16	.16	-.15	.06	.08	.22	.20	-.34	.06	.10	.25	.16						
14 Self Efficacy	.43	.34	-.09	.35	.33	.53	.37	-.16	.25	.10	.47	.50	.27					
15 Social Alienation ^a	-.21	-.25	.11	-.16	-.17	-.32	-.36	.28	-.07	-.12	-.43	-.25	-.30	-.28				
16 Stress Tolerance	.10	.21	-.09	.29	.13	.38	.33	-.26	.25	.19	.41	.20	.29	.34	-.46			
17 Tolerance to Injury	.02	.37	-.06	.44	.20	.21	.02	.15	.17	.16	.19	.21	-.02	.21	-.06	.19		
18 Written Communication	.37	.12	-.01	.06	.18	.27	.19	-.11	.29	.03	.39	.36	.14	.22	-.13	.16	.01	

Note. CBEF = Cadet Background and Experience Form. $n = 6,180-6,245$. Bolded values indicate statistical significance at $p < .05$ (two-tailed).

^aNegatively valenced, such that lower scores indicate more favorable standing on the construct of interest. ^bResponse distortion items have a 0-1 response scale. All other CBEF scales have a 1-5 item response scale.

Relationship between Predictors and Outcomes

Table 4.3 presents the descriptive statistics for the OMS outcomes, as well as the correlations with Advanced Camp CBEF scales.

- In the full sample, the Advanced Camp CBEF composite score ($r = .15$) and all Advanced Camp CBEF scales ($\text{Min } r = -.09$, $\text{Max } r = .37$) were significantly related to OMS scores in the expected direction. The CBEF composite ($r = .13$) and 10 additional CBEF scales ($\text{Min } r = -.12$, $\text{Max } r = .38$) were significantly related to OMS in the 4R sample.
- Among the scales, Achievement Orientation ($r = .34$ in the full sample; $r = .37$ in the 4R sample), Fitness Motivation ($r = .37$ in the full sample; $r = .38$ in the 4R sample), Goal Setting ($r = .28$ in the full sample; $r = .26$ in the 4R sample), and Grit ($r = .25$ in the full sample; $r = .23$ in the 4R sample) demonstrated the largest correlations with OMS for the full sample and the 4R sample.

Table 4.3. OMS Score Descriptives and Correlations with Advanced Camp CBEF Scales for 2019 Advanced Camp Outcomes

	All Cadets	4R Cadets
OMS Score Descriptives		
<i>n</i>	4,406	384
<i>M</i>	54.67	64.16
<i>SD</i>	15.18	13.99
Predictor-OMS Score Correlations		
CBEF Composite Score	.15	.13
Achievement Orientation	.34	.37
Army Identification	.09	.06
Behavioral Flexibility	.06	.04
Fitness Motivation	.37	.38
Goal Setting	.28	.26
Grit	.25	.23
Help Seeking	.11	.15
Hostility to Authority ^a	-.07	-.12
Informal Learning	.12	-.01
Army Commitment Propensity	-.09	.02
Oral Communication	.15	.07
Peer Leadership	.19	.20
Response Distortion ^{ab}	-.08	.02
Self Efficacy	.19	.20
Social Alienation ^a	-.09	-.09
Stress Tolerance	.13	.10
Tolerance to Injury	.12	.12
Written Communication	.15	.14

Note. CBEF = Cadet Background and Experience Form. All Cadets $n = 4,370 - 4,406$. 4R $n = 381 - 384$. Bolded values indicate statistical significance at $p < .05$ (two-tailed). To match OMS data from USACC to the Advanced Camp CBEF data, we used fuzzy merging. Cases that could not be matched confidently were not included.

^a Negatively valenced, such that lower scores indicate more favorable standing on the construct of interest. ^b Response distortion items have a 0-1 response scale. All other CBEF scales have a 1-5 item response scale.

Summary

Overall, the results of the Advanced Camp analyses suggest that the Advanced Camp CBEF demonstrated acceptable distributional properties and reliability, with some exceptions. Similarly, the OMS demonstrated acceptable distributional properties. Both scored and unscored Advanced Camp CBEF scales were significantly related to the OMS.

CHAPTER 5: SUMMARY AND FUTURE DIRECTIONS

Mark C. Young (ARI), Christopher R. Graves (HumRRO), Peter J. Legree, and
Robert N. Kilcullen (ARI)

In this final chapter, we summarize key findings and lessons learned from ARI's ROTC research effort for the August 2019 to August 2020 cycle. Next, 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 largely generalize to other applications.

Background

ROTC is a core commissioning source for Army officers, producing a significant portion of individuals who ultimately serve in senior leadership positions. Thus, the four-year national ROTC scholarship program, managed by the USACC, is an integral program to the US Army for encouraging highly qualified high school (HS) seniors to become Army officers. Each year, the USACC awards approximately 2,000 scholarships to entering ROTC students. Of these, a significant portion will eventually leave the program, especially within the first two years. Disenrollment from the scholarship program creates a significant cost to the Army in terms of lost scholarship money (over \$20,000 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 that began in 2007. Our initial focus was to develop a new non-cognitive motivational measure (now called the CBEF) to help inform the award of four-year ROTC scholarships. The goal was to identify applicants who were more likely to 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, HS grade point average). Such skills have been consistently 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.

Supporting the Award of Four-Year Scholarships

The validity evidence presented for the 2019 ROTC Summer Advanced Camp (L19) and 2018 freshman ROTC scholarship cadet (F18) samples show that the CBEF is predictive of valuable outcomes to the USACC (e.g., Outcome Metrics Score [OMS], APFT, GPA). Additionally, the effects observed in this research show significant relationships between the CBEF composite and first-year disenrollment, which is in line with prior longitudinal examinations that span multiple cohorts (Bynum & Young, 2020). While these effects are an improvement over the weaker relationships between the CBEF composite and first year disenrollment observed in the F17 cohort (Baldwin & Young, 2020), we will continue to monitor the predictive validity of the CBEF for future scholarship samples.

In addition to these results, the present research confirmed many of the psychometric properties evidenced in prior research, such as acceptable estimates of scale reliability and meaningful relationships with other measures in the nomological network and criterion space. This is an impressive finding, given that the testing is taking place on such a large scale, in a very high-stakes environment, and without the benefit of proctoring (i.e., online administration). In addition, the key outcomes we are predicting (e.g., 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 both operational and experimental scales administered on the CBEF align with previous trends. Most CBEF scales evidence adequate estimates of reliability and theoretically meaningful relationships with other related scales. Notably, some of the reliability estimates presented in this report are for experimental, unscored scales that do not contribute to the assignment of four-year ROTC scholarships. The zero-order correlation of the CBEF composite with key outcomes for the HS applicant sample and the Advanced Camp sample are weak and some are non-significant. However, incremental validity analyses show the utility of using the CBEF to predict continuance above and beyond the WPS (without the CBEF). Further, quintile plots provide some evidence of the CBEF's utility, showing notable differences between the top and bottom percentile group's performance and disenrollment rate. Taken together, the current research results evidence a valuable selection tool for selecting ROTC four-year scholars, albeit one that is undergoing continual improvements. As noted in Chapter 3, the HS CBEF composite (version 2.0) examined in this report has already been replaced with a new composite (version 3.0) which has evidenced higher validity in research conducted outside the scope of this report. We are continuing to track the performance of this new composite for the F19 applicant cohort and beyond. Below, we discuss limitations of the current research and directions for future effort.

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 USACC awards approximately 2,000 scholarships each year to those with the highest WPS (with CBEF) scores. Further, our model development has generally focused on the subset of scholarship awardees (about 1,000 cadets per academic year) who receive funding throughout the entire four years of ROTC. These are the awardees that USACC considers to be the most competitive and desirable. Because our sample of applicants/cadets is so highly vetted, there is considerable range restriction on the predictor measures, which constrains our validation findings. To account for the known range restriction in our prediction model, we report validity coefficients corrected for range restriction.

A second limitation results from the composition of the disenrollment data provided by USACC. Currently, the cadet disenrollment data only allow us 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 causes CBEF validity coefficients to be attenuated. That is, our validity estimates may be lower than necessary due to the inclusion of cadets who separated as a result of poor academic performance or involuntarily (e.g., perhaps due to an injury, illness, or a family emergency that requires a cadet to leave school). It would be useful to be able to eliminate cases in which the former category of involuntary separation is the primary separation factor, however, we are still interested in tracking separations that are, to some degree, under a cadet's control. These latter cases may represent a significant proportion of involuntary separations, as U.S. Air Force cadet research suggests that lower cognitive ability has a greater impact than motivation/commitment on involuntary separation (Mowday & Lee, 1986). In the future, we will continue to work with USACC to obtain more detailed ROTC separation codes to allow us to make finer distinctions regarding the reasons for withdrawal. This would provide us greater granularity in distinguishing between voluntary and involuntary separations, thereby allowing more accurate validity estimates.

Future Directions

The anticipated future directions for ARI's ROTC research program include advances in assessment implementation as well as avenues for future research.

ARI has recently supported the USACC in its implementation of the On-Campus CBEF nationwide. Each year, the USACC awards approximately 2,000 two- and three-year scholarships to freshman and sophomore cadets who have already enrolled in ROTC, and this new CBEF version informs that award decision process. The On-Campus CBEF is similar to the HS CBEF (used to award four-year scholarships) but designed to predict performance in ROTC. This instrument became operational in 2019. Our scoring algorithm combines applicants' scores on this CBEF with other information currently 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 might support other cadet assessment needs (e.g., determining whether a student attends Basic Camp or informing branch assignment).

Broadly speaking there are five 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, Kilcullen & Koch, 2019; Legree, Purl, Kilcullen, & Young, 2019). In this method, analysts optimally weight individual difference scores (against a key) for each applicant 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 (OMS, APFT scores, and GPA), which are of great importance to USACC. This research is continuing and shows promise for our ability to significantly boost the operational validity of the CBEF.

Second, we will pursue an opportunity to evaluate whether additional existing data might enhance the CBEF's capability to predict continuance in the ROTC program. Specifically, we plan to examine information on entry waiver status (e.g., whether or not a cadet entered under a waiver and the type of waiver involved) and scholarship applicant data (e.g., self-reported HS activities such as sports participation) not currently captured by the CBEF. If promising new predictors are identified from this research, we will outline "best practice" recommendations for how the predictors could be used in the scholarship assessment process (e.g., incorporate them into the Whole Person Score; disqualify applicants based on specific high-risk indicators, etc.).

Third, we will conduct a unique exploration of a key criterion used to evaluate the CBEF. Activities from Advanced Camp have historically been used to inform USACC's computation of the ROTC commissioning OMS, which USACC uses to determine cadets' standing on the Order of Merit List (OML). The OMS and its component scores represent critical cadet performance outcomes that are used to evaluate the CBEF, as well as to predict future officer performance. Without the benefit of the traditionally computed OMS and its component scores for the 2020 Advanced Camp cohort, we will need to conduct additional analyses to evaluate the alternative OMS created by USACC and assess its comparability to the historical OMS, as well as its suitability as a substitute for research purposes.

A fourth avenue for our investigations is expanding the number and breadth of constructs assessed by the CBEF. For example, we have continued the development of new scales that have potential for predicting both performance and continuance in ROTC as well as beyond the point of commissioning. Although the Coronavirus Disease 2019 (COVID-19) pandemic precluded the administration of new CBEF scales at the 2020 Advanced Camp, we anticipate administration of these scales in subsequent camps. Together, we recognize the promise of new content for enhancing the prediction of ROTC continuance. We anticipate that the exploration and testing of new constructs will be ongoing.

Fifth, we are considering alternative measurement approaches for future research. For example, we might consider an implicit approach to predictor measurement (e.g., a conditional reasoning test) to improve the measurement of some scales, which may otherwise be transparent to respondents.

While the initial focus of our research program was 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),⁹ as well as performance outcomes such as promotion rates and awards.¹⁰ In the context of Officer Candidate School, we have already reported positive findings for predicting continuance beyond the ADSO (Allen & Young, 2012; Green & Burgoyne, 2020).

⁹ This obligation is four years for those receiving the four-year national ROTC scholarship.

¹⁰ Army personnel data files capture such outcomes on an ongoing basis.

Because the HS CBEF testing of scholarship applicants under operational conditions began in 2010 (for the 2011/2012 academic year), applicants who were originally tested at that time could now have reached the point of their four-year ADSO. In addition, cadets who (as rising seniors) we first 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 is well beyond the point of their ADSO, and some within this cohort will have already reached the rank of Major (O4). We are already in the process of validating the CBEF against critical post-commissioning outcomes (including supervisor performance ratings) under a related project focused on the officer branching process (Legree, Purl, Kilcullen, & Young, 2019). The objective of that project 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.

From a Talent Management perspective, the yearly testing of 6,000 to 7,000 ROTC cadets (i.e., rising seniors) at the ROTC Summer Advanced Camp 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). This research has the potential to help USACC 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 could also 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 could inform a revised OMS computation so that it better predicts future officer success. As of now, the earliest ROTC cohort to have completed the CBEF during Advanced Camp is reaching the 10-year career mark, and the early indicators of career quality (i.e., Command and General Staff College [CGSC] residency) for these officers are becoming available.

REFERENCES

- Adams, D. R., Meyers, S. A., & Beidas, R. S. (2016). The relationship between financial strain, perceived stress, psychological symptoms, and academic and social integration in undergraduate students. *Journal of American College Health*, 64(5), 362-370. <https://doi.org/10.1080/07448481.2016.1154559>
- Allen, M. T., & Young, M. C. (Eds.). (2012). *Longitudinal validation of non-cognitive officer selection measures for the U.S. Army Officer Candidate School (OCS)* (ARI Technical Report 1323). U.S. Army Research Institute for the Behavioral and Social Sciences. DTIC No ADA565513
- Baldwin S., & Young, M.C. (Eds.), *Research on the Cadet Background and Experience Form (CBEF) to support Army ROTC personnel assessment (2018-2019)* (ARI Technical Report 1358). U.S. Army Research Institute for the Behavioral and Social Sciences. DTIC No AD1109745
- Ball, S.A., Tennen, H., Poling, J.C., Kranzler, H.R., & Rounsaville, B.J. (1997). Personality, temperament, and character dimensions and the DSM-IV personality disorders in substance abusers. *Journal of Abnormal Psychology*, 106, 545-553. <https://doi.org/10.1037/0021-843X.106.4.545>
- Booth-Kewley, S., Highfill-McRoy, R. M., Larson, G. E., & Garland, C. F. (2010). Psychosocial predictors of military misconduct. *The Journal of Nervous and Mental Disease*, 198(2), 91-98. <https://doi.org/10.1097/NMD.0b013e3181cc45e9>
- Bynum, B. H., & Young, M. C. (Eds.). (2020). *Validation of the Cadet Background and Experience Form (CBEF) to support Army ROTC personnel assessment (2015-2018)* (ARI Technical Report 1383). U.S. Army Research Institute for the Behavioral and Social Sciences. DTIC No AD1107158
- Burket, G. R. (1964). A study of reduced rank models for multiple prediction. *Psychometric Monograph* (No. 12). <https://doi.org/10.21236/ad0441337>
- Cheek, N.N., & Schwartz, B. (2016). On the meaning and measurement of maximization. *Judgment and Decision Making*, 11(2), 126-146. <https://works.swarthmore.edu/fac-psychology/929>
- Cloninger, C.R., Przybeck, T.R., & Svrakic, D.M. (1991). The tridimensional personality questionnaire: U.S. normative data. *Psychological Reports*, 69, 1047-1057. <https://doi.org/10.2466/pr0.1991.69.3.1047>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Crum, A. J., Salovey, P., & Achor, S. (2013). Rethinking stress: The role of mindsets in determining the stress response. *Journal of Personality and Social Psychology*, 104(4), 716. <https://doi.org/10.1080/10615806.2016.1275585>

- Dahling, J. J., & Thompson, M. N. (2013). Detrimental relations of maximization with academic and career attitudes. *Journal of Career Assessment*, 21(2), 278-294.
<https://doi.org/10.1177/1069072712471322>
- Forbush, K.T., Shaw, M., Graeber, M.A., Hovick, L., Meyer, V.J., Moser, D.J., Bayless, J., Watson, D., & Black, D.W. (2008). Neuropsychological characteristics and personality traits in pathological gambling. *CNS Spectrums*, 13, 306-315.
<https://doi.org/10.1017/S1092852900016424>
- Grandey, A. A. (2000). Emotional regulation in the workplace: A new way to conceptualize emotional labor. *Journal of Occupational Health Psychology*, 5(1), 95-110.
<https://doi.org/10.1037/1076-8998.5.1.95>
- Green, J. P., & Burgoyne, T. (2020). Validation of OBEF against long-term criteria among OCS candidates. In S. Baldwin and M. C. Young (Eds.), *Research on the Cadet Background and Experience Form (CBEF) to support Army ROTC personnel assessment (2018-2019)* (ARI Technical Report 1358). U.S. Army Research Institute for the Behavioral and Social Sciences.
- Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, 2(3), 271-299. <https://doi.org/10.1037/1089-2680.2.3.271>
- Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, 26(1), 1-26. <https://doi.org/10.1080/1047840X.2014.940781>
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85(2), 348-362. <https://doi.org/10.1037/0022-3514.85.2.348>
- Gross, J., Sheppes, G., & Urry, H. (2011). Cognition and Emotion Lecture at the 2010 SPSP Emotion Preconference. *Cognition & Emotion*, 25(5), 765-781.
<https://doi.org/10.1080/02699931.2011.555753>
- Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. *Handbook of emotion regulation* (pp. 3-24). New York, NY: Guilford Press.
<https://dl.uswr.ac.ir/bitstream/Hannan/130948/1/2006%20-%20Handbook%20of%20Emotion%20Regulation%20-%20Gross%282006%29.pdf>
- Hellevik, O. (2009). Linear vs logistic regression when the dependent variable is a dichotomy. *Quality and Quantity*, 43(1), 59-74. <https://doi.org/10.1007/s11135-007-9077-3>
- Henderson, M.J., & Galen, L.W. (2003). A classification of substance-dependence men on temperament and severity variables. *Addictive Behavior*, 28, 741-760.
[https://doi.org/10.1016/S0306-4603\(01\)00269-6](https://doi.org/10.1016/S0306-4603(01)00269-6)
- Howard, M.O., Kivlahan, D., & Walker, R.D. (1997). Cloninger's tridimensional theory of personality and psychopathology: Applications to substance use disorders. *Journal of Studies on Alcohol*, 58, 48-66. <https://doi.org/10.15288/jsa.1997.58.48>

- Jamieson, J.P., Crum, A.J., Goyer, J.P., Marotta, M.E., & Akinola, M. (2018). Optimizing stress responses with reappraisal and mindset interventions: An integrated model. *Anxiety, Stress, & Coping*, 31(3), 245-261. <https://doi.org/10.1080/10615806.2018.1442615>
- John, O. P., & Gross, J. J. (2007). Individual differences in emotion regulation. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 351-372). New York, NY: Guilford Press. <https://dl.uswr.ac.ir/bitstream/Hannan/130948/1/2006%20-%20Handbook%20of%20Emotion%20Regulation%20-%20Gross%282006%29.pdf>
- Ko, C.H., Yen, J.Y., Chen, S.H., Wu, K., & Yen, C.F. (2006). Tridimensional personality of adolescents with Internet addiction and substance use experience. *Canadian Journal of Psychiatry*, 51, 887-894. <https://doi.org/10.1177/070674370605101404>
- Legree, P. J., Ness, A. M., Kilcullen, R. N., & Koch, A. J. (2019). *Enhancing the validity of rating-based tests* (ARI Technical Report 1371). U.S. Army Research Institute for the Behavioral and Social Sciences. DTIC No ADA1066057.
- Legree, P. J., Purl, J., Kilcullen, R. N., & Young, M. C. (2019, April). *Cadet training and personality metrics predict officer performance ratings: R = .33*. Paper presented at the 34th Annual Conference of the Society for Industrial Organizational Psychology, Washington, DC, United States.
- Liu, Y., Prati, L. M., Perrewé, P. L., & Brymer, R. A. (2010). Individual differences in emotion regulation, emotional experiences at work, and work-related outcomes: A two-study investigation. *Journal of Applied Social Psychology*, 40(6), 1515-1538. <https://doi.org/10.1111/j.1559-1816.2010.00627.x>
- Mahalanobis, P. C. (1936). On the generalized distance in statistics. *Proceedings of the National Institute of Sciences (Calcutta)*, 2, 49-55.
- Mowday, R. T., & Lee, T. W. (1986, August). The influence of propensity to become committed in the development of commitment and prediction of turnover during organizational entry. *Academy of Management Proceedings*, 193-197.
- Netemeyer, R.G., Warmath, D., Fernandes, D., & Lynch Jr., J.G. (2017). How am I doing? Perceived financial well-being, its potential antecedents, and its relation to overall well-being. *Journal of Consumer Research*, 45(1), 68-89. <https://doi.org/10.1093/jcr/ucx109>
- Nezlek, J. B., & Kuppens, P. (2008). Regulating positive and negative emotions in daily life. *Journal of Personality*, 76(3), 561-580. <https://doi.org/10.1111/j.1467-6494.2008.00496.x>
- Putka, D. J., Beatty, A. S., & Reeder, M. C. (2018). Modern prediction methods: New perspectives on a common problem. *Organizational Research Methods*, 21(3), 689-732. <https://doi.org/10.1177/1094428117697041>

- Richards, J. M., & Gross, J. J. (2000). Emotion regulation and memory: The cognitive costs of keeping one's cool. *Journal of Personality and Social Psychology*, 79(3), 410-424. <https://doi.org/10.1037/0022-3514.79.3.410>
- Robbins, S. B., Allen, J., Casillas, A., Peterson, C. H., & Le, H. (2006). Unraveling the differential effects of motivational and skills, social, and self-management measures from traditional predictors of college outcomes. *Journal of Educational Psychology*, 98(3), 598. <https://doi.org/10.1037/0022-0663.98.3.598>
- Robbins, S. B., Oh, I.S., Le, H., & Button, C. (2009). Intervention effects on college performance and retention as mediated by motivational, emotional, and social control factors. Integrated meta-analytic path analyses. *Journal of Applied Psychology*, 94(5), 1163-1184. <https://doi.org/10.1037/a0015738>
- Schmader, T., & Mendes, W. B. (2015). Putting feelings in a social context: Three case studies applying Gross's extended model of emotion regulation. *Psychological Inquiry*, 26(1), 116-122. <https://doi.org/10.1080/1047840X.2015.962445>
- Simon, H.A. (1955). A behavioral model of rational choice. *The Quarterly Journal of Economics*, 69(1), 99-118. <https://doi.org/10.2307/1884852>
- Trombitas, K. S. (2012). Financial stress: An everyday reality for college students. *Inceptia*. Retrieved from <https://www.inceptia.org/pdf/inception-financialstress-white-paper.pdf>
- Van Ammers, E.C., Sellman, J.D., & Mulder, R.T. (1997). Temperament and substance abuse in schizophrenia: Is there a relationship? *Journal of Nervous and Mental Disorders*, 185, 283-288. <https://doi.org/10.1097/00005053-199705000-00001>
- Vukov, M., Baba-Milic, N., Lecic, D., Mijalkovic, S., & Marinkovic, J. (1995). Personality dimensions of opiate addicts. *Acta Psychiatrica Scandinavica*, 91, 103-107. <https://doi.org/10.1111/j.1600-0447.1995.tb09748.x>
- Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin*, 138(4), 775-808. <https://doi.org/10.1037/a0027600>
- White, L. A., Nord, R. D., Mael, F. A., & Young, M. C. (1993). The assessment of background and life experiences (ABLE). In T. Trent & J. H. Laurence (Eds.), *Adaptability screening for the armed forces*. Office of Assistant Secretary of Defense (Force Management and Personnel).
- White, L. A., Young, M. C., & Rumsey, M.G. (2001). Assessment of Background and Life Experiences (ABLE) implementation issues and related research. In J. P. Campbell (Ed.), *Exploring the Limits in Personnel Selection and Classification*. Erlbaum.

APPENDIX A: DEVELOPMENT OF NEW CBEF SCALES

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To improve the prediction of ROTC continuance, we identified constructs for which to develop biodata items and include in the Advanced Camp CBEF in 2020.¹¹ Altogether, eight potential constructs were identified and five were selected for item development.

Literature Review

To identify potential new constructs, we conducted a literature review looking at predictors of outcomes related to ROTC continuance. For example, we researched predictors of college dropout/retention, academic success, organizational turnover, military retention, and reasons for ROTC disenrollment (e.g., misconduct, drug use). Via this literature review, we identified five potential new constructs for possible addition to the CBEF. We also revisited two constructs that had been previously proposed, but which were not selected for item development. These constructs had been administered previously as experimental CBEF scales, but demonstrated potential for a reinvestigation with different and/or additional items. Finally, we considered an additional construct gleaned from engagement with Army officers for potential item development. A summary of the eight proposed constructs, listed alphabetically, is provided in Table A.1.

Table A.1. Summary of Proposed Constructs

Construct	Definition	Potential Subscales
Emotion Regulation	Attempts individuals make to influence which emotions they have, when they have the emotions, and how they experience or express these emotions	Cognitive Reappraisal Suppression
Maximizing	Decision-making style that involves seeking the single best option when making a choice	Maximization Goal Alternative Search
Multitasking*	Ability to switch between multiple tasks that require a conscious shift of attention over a short time span	Dual Tasking Task Switching Task Interruption
Narcissism*	A grandiose yet fragile sense of self and entitlement, as well as a preoccupation with success and demands for admiration	Leadership/Authority Self-absorption/Self-admiration Superiority/Arrogance Exploitativeness/Entitlement
Novelty Seeking	The inclination to seek new stimuli	Exploratory Excitability v. Stoic Rigidity Impulsiveness v. Reflection Extravagance v. Reserve Disorderliness v. Regimentation

¹¹ These new scales were intended for consideration for Advanced Camp 2020. However, due to the 2019 Coronavirus (COVID-19) pandemic, no scales were administered in 2020. Thus, these new scales are now under consideration for Advanced Camp 2021.

Table A.2. (Continued)

Construct	Definition	Potential Subscales
Perceived Financial Strain	Perceived economic stress and lack of economic support	Affective Evaluations Behaviors
Stress Mindset	How an individual perceives the experience of stress, as well as the expectations ascribed to stress (i.e., stress-is-enhancing or stress-is-debilitating)	Performance/Productivity Health/Wellbeing
Study Skills	Ability to manage time and allocate other resources in accordance with the demands of the academic tasks; ability to organize, summarize, and integrate material	Information Processing Selecting Main Ideas Test Strategies

Note: * Denotes constructs previously administered as experimental CBEF scales.

Construct Choice

We selected five constructs for item development largely based on the perceived unique value of each construct when compared to the other constructs under consideration as well as constructs that had been included on the CBEF in the past. We also considered potential relevance to classification research. Table A.2 identifies the five constructs selected for item development, along with their dimensions. Next, we provide a brief description of each construct, dimension, and empirical/theoretical relevance to the ROTC context.

Table A.3. Constructs Selected for Item Development

Construct	Dimensions
Emotion Regulation	Cognitive Reappraisal Suppression
Maximizing	Maximization Goal Alternative Search
Novelty Seeking	Disorderliness Impulsiveness
Perceived Financial Strain	Affective Evaluations Behaviors
Stress Mindset	Performance/Productivity Health/Wellbeing

Emotion Regulation

Emotion regulation (ER) is defined as the attempts individuals make to influence which emotions they have, when they have the emotions, and how they experience or express these emotions (Gross, 1998). The core characteristic of ER is that it follows the activation of a goal for the emotion's trajectory (Gross et al., 2011). For example, one may desire to downregulate anger to avoid an argument. On the other hand, someone might want to upregulate happiness to fit in at a social event.

Although there are a number of ER strategies that individuals use, two commonly used and studied strategies are cognitive reappraisal and suppression (e.g., Grandey, 2000; Gross & John, 2003; John & Gross, 2007). Cognitive reappraisal involves changing the situational meaning and, therefore, the impact of the internal emotional experience (Gross & Thompson, 2007). This oftentimes involves thinking through the emotion-evoking event to alter one's interpretation of it and one's ability to manage the situation (Gross & John, 2003; Webb et al., 2012). Suppression functions differently by attempting to inhibit the physiological, cognitive, or behavioral responses to an emotion-eliciting event (Gross & Thompson, 2007). To effectively suppress emotions, individuals may try to hide their emotions by not expressing them physically or may attempt to block the emotions by not allowing themselves to experience the emotions (Webb et al., 2012).

Research on ER has grown rapidly in a variety of psychological fields (e.g., cognitive, health, social, industrial/organizational) over the past two decades (Gross, 2015), demonstrating the importance of ER in both social and academic realms. For example, ER is beneficial in regulating social intergroup interactions (Schmader & Mendes, 2015) and can positively influence psychological adjustment (Nezlek & Kuppens, 2008). A related concept of emotional control has been found to influence motivational behaviors and goal-setting activities in college settings, with positive effects on academic performance and resultant academic retention (Robbins et al., 2006; Robbins et al., 2009).

We wrote biodata items to target both cognitive reappraisal and suppression. While both strategies are forms of ER, which is overall beneficial to wellbeing and other outcomes, research into specific strategies has demonstrated that cognitive reappraisal is more effective and cognitively efficient than suppression (Richards & Gross, 2000; Gross & John, 2003; Liu et al., 2010). However, research has also emphasized the importance of context in influencing the effectiveness of ER strategies. The ROTC context is unique and, therefore, the social norms and expectations in this context may impact the effectiveness of ER strategies and may do so differently for cognitive reappraisal and suppression.

Maximizing

Maximizing is a decision-making style that involves seeking the single best option when making a choice (Dahling & Thompson, 2013). Maximizing is often contrasted with satisficing, a decision-making style in which a decision is made based on the first acceptable option that meets a certain threshold. Maximizing is thought to be maladaptive because people have bounded rationality, meaning they possess limited resources to identify the single best outcome (Simon, 1955).

Maximizing can be especially difficult when there are a large number of options, and one has limited information, such as when HS students choose their career. Empirical investigations of maximizing's effect on career-related outcomes support this claim, as maximizing is related to lower satisfaction and perceived fit with college major, lower perceived fit with jobs, higher employment turnover cognitions, and less satisfaction with career progression (Dahling & Thompson, 2013). Maximizers experience these negative appraisals largely influenced by feelings of regret (Dahling & Thompson, 2013). Thus, due to maximizers' high standards when making decisions, in that they want the best possible outcome and will not settle for just "good

enough," we expect cadets high in maximizing to be more likely to regret enrolling in ROTC and to have higher rates of disenrollment.

Per Cheek and Schwartz (2016), we conceptualized maximizing via a two-component model, consisting of pursuit of maximization as a goal and maximizing as a strategy of searching alternatives. An important emphasis regarding the maximization goal is that this goal does not refer to having "high standards" for making a decision. Rather, the goal is to choose the best. Cheek and Schwartz (2016) have argued that even "satisficers" can have high standards for their decisions, though they are happy with any options that meet these standards, whereas maximizers are only satisfied with the best. Another distinguishing factor is that while satisficers are more willing to lower their standards when necessary, maximizers are not (Cheek & Schwartz, 2016).

Alternative search is the strategy of seeking out alternatives and comparing them. In situations with many options, this strategy largely involves seeking out the options, whereas in situations with fewer options, the strategy involves seeking out information about the available options and comparing them.

Novelty Seeking

The trait of novelty seeking refers to the inclination to seek new stimuli. Being higher than average on this trait is associated with impulsive decision making, exploratory activity in response to novel stimulation, quick temper loss, disorderliness, and avoidance of frustration (Howard et al., 1997). In contrast, individuals lower than average in novelty seeking tend to be reflective, rigid, loyal, stoic, slow-tempered, orderly, and persistent.

Cloninger's model of temperament, which includes novelty seeking, has been primarily used in the prediction of mental and personality disorders and addictive behaviors. In fact, previous research has shown novelty seeking to be one of the most salient variables characterizing substance users, including those using alcohol (Henderson & Galen, 2003), tobacco (Henderson & Galen, 2003), cannabis (Van Ammers et al., 1997), opiates (Vukov et al., 1995), and cocaine (Ball et al., 1997). Research has also shown novelty seeking to be related to pathological gambling (Forbush et al., 2008) and Internet addiction (Ko et al., 2006). Such behaviors are directly related to various disenrollment codes from ROTC, including "tested positive for drugs" and "security clearance not granted."

Additionally, even if the novelty-seeking personality trait does not manifest itself in the form of substance abuse or personality disorders, the other traits associated with higher levels of novelty seeking (e.g., impulsivity, quick-temperedness, disorderliness) are undesirable and unproductive in the ROTC context. On the other hand, characteristics of those low in novelty seeking (e.g., loyalty, orderliness, persistence) match the ROTC context well, thus leading to the prediction that individuals lower in novelty seeking will be more likely to succeed in, and therefore continue in, ROTC contexts and beyond.

Novelty seeking is often conceptualized as having four dimensions: Exploratory Excitability (versus Stoic Rigidity), Impulsiveness (versus Reflection), Extravagance (versus Reserve), and Disorderliness (versus Regimentation; Cloninger et al., 1991). For our item writing efforts, we

focused on the two dimensions we believe are most relevant to and potentially predictive of ROTC continuance: Impulsiveness and Disorderliness.

Individuals who score high on Impulsiveness tend to make quick decisions, often based on incomplete information, and have trouble controlling their impulses. Contrastingly, individuals who score low on this dimension are characterized as reflective and analytical.

Individuals who score high on Disorderliness tend to be quick to lose their temper and prefer activities without strict rules and regulations. They are described as likely to run away from situations that are frustrating, boring, or uncomfortable physically and/or psychologically.

Perceived Financial Strain

Perceived financial strain refers to “perceived economic stress and lack of economic support” (Adams et al., 2016, p.363). This construct encompasses the perceived scarcity of financial resources, the degree of resulting worry and anxiety, and the pattern of coping mechanisms employed. This construct focuses on an individual’s assessment of his or her current and future financial state (Netemeyer et al., 2018).

Research has found that four of the top five stressors for college students are related to finances (Trombitas, 2012). Additionally, the psychological effects of *perceived* financial strain have been shown to be distinct from those of objective financial circumstance (Adams et al., 2016). Cadets with higher perceived financial strain are likely to experience stress and increased cognitive load that has been shown to act as a barrier to academic and social integration. Inadequate integration reduces the sort of engagement that often acts as a driver of retention (Adams et al., 2016). Likewise, the strain of managing potential personal/family conflicts would likely function as a driver of attrition by pulling cadets away from their ROTC responsibilities (Booth-Kewley et al., 2010). Overall, cadets with greater perceived financial strain may experience lower integration and higher negative affect.

We wrote items tapping both affective and behavioral indicators of feeling financial strain. Items written for the affective evaluation dimension focus on emotions that result from one’s perceived financial situation, with emotions such as worry, concern, fear, and anxiety indicating higher levels of perceived financial strain. Items for the behavioral dimension focus on behaviors that individuals may display when feeling financial strain, such as engaging in or avoiding money-related situations.

Stress Mindset

Stress mindset refers to how an individual perceives the experience of stress as well as the expectations ascribed to stress (Jamieson, et al., 2018). Individuals can perceive stress as having either enhancing or debilitating consequences (Crum et al., 2013). Individuals with a “stress-is-enhancing” mindset seek to optimize the stress response; rather than work to reduce stress, these individuals believe that stress results in positive outcomes and, therefore, use stress to improve their performance, productivity, health, and wellbeing. On the other hand, individuals with a “stress-is-debilitating” mindset believe that stress has negative effects on these outcomes.

While related, stress mindset and stress tolerance measure different aspects of the experience of stress. Stress tolerance measures the *amount* of stress one experiences in work environments, while stress mindset measures the *expectations* ascribed to stress. In other words, while stress tolerance involves the appraisal of stress, stress mindset influences how individuals behaviorally approach stress. In careers where stress is a normal occurrence, such as in the U.S. Army, individuals with a stress-is-enhancing may have better performance during these times of stress. Identifying Soldiers with stress-is-enhancing mindsets may help in assignment by identifying which Soldiers may excel in roles and branches that encounter more frequent stress inducing circumstances.

We wrote items to both mindsets (i.e., stress-is-enhancing and stress-is-debilitating), divided into two dimensions based on potential outcomes. The first dimension focuses on stress' effects on performance and productivity, while the second dimension focuses on the effects on individuals' health and wellbeing. These two dimensions are expected to be highly correlated, as stress mindset refers to an individual's overall perceptions of stress in terms of its expected effect on all outcomes. We divided the items according to outcome simply to ensure more thorough coverage of the construct.

Item Development

We assembled a team of four experienced item writers to draft and review biodata items for the constructs described above. We trained the team on biodata development best practices, such as using observable behaviors or reactions that are theoretically verifiable and attempting to reduce social desirability to the extent possible. We asked writers to draft items that reflected situational choice, reactions to a situation, others' reactions to situations, or outcomes associated with situational exposure. Additionally, we presented writers with characteristics of biodata items that have been shown to be predictive in an ROTC context. These characteristics include objectivity, job-relevancy, contextualization, behavioral basis, and a current temporal focus (Putka et al., 2018).

For each construct, we assigned two writers to each dimension of the construct. Before drafting an item to target a dimension, writers read a foundational article about the dimension and conducted searches for additional articles and references as necessary to develop a thorough understanding. Writers also referenced existing, non-biodata scales for relevant constructs to spark ideas for items.

Each writer individually drafted between six and eight items targeted to one dimension, then exchanged items with the other writer assigned to the same dimension to review and revise iteratively. Once all items for a particular construct were finalized by a dimension team, writers swapped items across teams for additional review. For example, for Emotion Regulation, once writers drafting items tapping Cognitive Reappraisal finalized their items, they provided these items to the Suppression writers to review. As a final internal step, the full team of item writers participated in a working meeting to identify and resolve any issues. The items then received a final review by experts not involved with the item writing.

Because we developed a greater number of items per construct than will be administered, we recommended specific items for each construct to include in data collection. We based our recommendations on the following factors:

- balance of reverse to standard scoring;
- dimension coverage (i.e., tapping different portions of each dimension);
- balance of scale types (e.g., agreement, extent, frequency);
- reducing redundancy across items; and
- reducing overlap across constructs.

Summary

Using existing literature on the military, college dropout, and organizational retention, as well as information regarding ROTC disenrollment, we identified eight constructs that may add to the value of the CBEF in predicting ROTC continuance and performance. We developed biodata items for five of these constructs, targeting two relevant dimensions per construct. These items will be administered in future Advanced Camp data collections, and we will analyze and evaluate the scales against Advanced Camp criteria.