

**Study  
Report  
2009-06**

**Initial Development and Validation of  
Assessments for Predicting Disenrollment  
of Four-Year Scholarship Recipients from  
the Reserve Officer Training Corps**

**Dan J. Putka (Ed.)**  
Human Resources Research Organization



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

**January 2009**

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## REPORT DOCUMENTATION PAGE

1. REPORT DATE (dd-mm-yy) January 2009		2. REPORT TYPE Final		3. DATES COVERED (from . . . to) July 2007 - April 2008	
4. TITLE AND SUBTITLE Initial Development and Validation of Assessments for Predicting Disenrollment of Four-Year Scholarship Recipients from the Reserve Officer Training Corps				5a. CONTRACT OR GRANT NUMBER DASW01-03-D-0015 ( DO 0042)	
				5b. PROGRAM ELEMENT NUMBER 665803	
6. AUTHOR(S) Dan J. Putka, (Ed.), Human Resources Research Organization				5c. PROJECT NUMBER D730	
				5d. TASK NUMBER 318	
				5e. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Human Resources Research Organization 66 Canal Center Plaza, Suite 400 Alexandria, Virginia 22314				8. PERFORMING ORGANIZATION REPORT NUMBER FR-08-26	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Research Institute for the Behavioral and Social Sciences 2511 Jefferson Davis Highway Arlington, VA 22202-3926				10. MONITOR ACRONYM ARI	
				11. MONITOR REPORT NUMBER Study Report 2009-06	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES Subject Matter POC and Contracting Officer's Representative: Trueman Tremble					
14. ABSTRACT ( <i>Maximum 200 words</i> ): The Reserve Officer Training Corps (ROTC) is an essential commissioning source for the U.S. Army. ROTC has recently produced the majority of the Army's new Officers and yields Officers that eventually reach the highest ranks. Analyses have indicated that Officers graduating from the four-year ROTC scholarship program tend to be more likely than their non-scholarship ROTC, U.S. Military Academy (USMA), and Officer Candidate School (OCS) counterparts to leave after their initial Active Duty Service Obligation (ADSO). Furthermore, relative to non-scholarship Cadets, four-year scholarship Cadets tend to be less likely to complete the ROTC program and become commissioned Officers. Data collected for the current project showed that approximately 10.3% of four-year scholarship freshmen in 2007 disenrolled between their freshman and sophomore years. The primary purpose of the current project was to develop and validate a new measure that would improve the prediction of ROTC continuance for four-year scholarship recipients. The long-term objective of this project is to provide the foundation for future longitudinal research that examines the impact of the new measures for predicting ROTC program completion, commissioning, and career continuance in the Army. This report describes the development of the Cadet Background and Experience Form (CBEF) and its initial validation for predicting disenrollment criteria.					
15. SUBJECT TERMS ROTC; attrition; validation; Cadets; personnel screening tests; psychological tests					
SECURITY CLASSIFICATION OF			19. LIMITATION OF ABSTRACT  Unlimited	20. NUMBER OF PAGES	21. RESPONSIBLE PERSON  Diane Hadjiosif Technical Publications Specialist (703) 602-8047
16. REPORT Unclassified	17. ABSTRACT Unclassified	18. THIS PAGE Unclassified			



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**January 2009**

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**Army Project Number**  
**665803D730**

**Personnel and Training**  
**Analysis Activities**

Approved for public release; distribution is unlimited



# **INITIAL DEVELOPMENT AND VALIDATION OF ASSESSMENTS FOR PREDICTING DISENROLLMENT OF FOUR-YEAR SCHOLARSHIP RECIPIENTS FROM THE RESERVE OFFICER TRAINING CORPS**

## **EXECUTIVE SUMMARY**

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### **Research Requirement**

The Reserve Officer Training Corps (ROTC) is clearly an essential commissioning source for the U.S. Army. ROTC has recently produced the majority of the Army's new Officers and yields Officers that eventually reach the highest ranks. Analyses have indicated that Officers graduating from the four-year ROTC scholarship program tend to be more likely than their non-scholarship ROTC, U.S. Military Academy (USMA), and Officer Candidate School (OCS) counterparts to leave after their initial Active Duty Service Obligation (ADSO). Furthermore, relative to non-scholarship Cadets, four-year scholarship Cadets tend to be less likely to complete the ROTC program and become commissioned Officers. Data collected for the current project showed that approximately 10.3% of four-year scholarship freshmen in 2007 disenrolled between their freshman and sophomore years. For these reasons, the U.S. Army Cadet Command needs valid, reliable measures to use in awarding scholarships to individuals who are likely to complete their programs. Toward that end, the U.S. Army Research Institute (ARI) for the Behavioral and Social Sciences initiated a research project to develop and validate an instrument to improve selection of four-year scholarship recipients.

The short-term goal of this project was to develop a new measure that improves the prediction of ROTC continuance for four-year scholarship recipients, beyond the level of prediction already afforded by the current scholarship award process. Specifically, the new measure was to improve prediction beyond that provided by Whole Person Scores (WPS) that are computed based on the applicant's responses to the application. The long-term objective of this project is to provide the foundation for future longitudinal research that examines the impact of the new measures for predicting ROTC program completion, commissioning, and career continuance in the Army.

### **Procedure**

ARI developed a new measure to improve scholarship recipient selection—the Cadet Background and Experiences Form (CBEF). The initial version of the CBEF had two primary parts: the Rational Biodata Inventory (RBI) and the Propensity for Commitment (PFC) scales. In addition to these parts, several additional items were included to help evaluate the functioning of the RBI and PFC scales. In the spring of 2007, ARI and Cadet Command administered the CBEF to freshman, four-year scholarship recipients. ARI contracted with the Human Resources Research Organization (HumRRO) to (a) analyze data arising from this data collection, (b) evaluate the CBEF's functioning and potential for predicting disenrollment, and (c) make revisions to the CBEF to improve its potential for identifying applicants at heightened risk of subsequent disenrollment.

HumRRO collected application data and disenrollment data from Cadet Command for four-year scholarship recipients in the sample and created an analysis database. In turn, HumRRO analyzed the data using basic statistical approaches and logistic regression.

## **Findings**

Three criterion variables were used to evaluate the potential of the CBEF's RBI and PFC scales for predicting (a) disenrollment (versus enrollment), (b) Cadets' self-reported likelihood of becoming an Army Officer, and (c) Cadets' self-reported likelihood of making the Army a career. When considered in isolation, several CBEF scales were significantly predictive of all three criteria, notably RBI Army Identification, Achievement Orientation, Fitness Motivation, Self-Efficacy, Hostility to Authority, and PFC Persistence. When considered in the context of all CBEF scales and Whole Person Scores (WPS) via logistic regression analyses: (a) only the RBI Army Identification scale remained significantly related to all three criteria, (b) the RBI Educational Identification scale was significantly related to disenrollment and Cadets' self-rated likelihood of becoming an Army Officer, and (c) the RBI Self-Efficacy scale was significantly related to Cadets' self-rated likelihood of making the Army a career. Furthermore, these logistic regression analyses indicated that addition of CBEF scale scores (in particular, RBI scale scores) to a model including only WPS significantly incremented the validity of WPS for predicting all three criteria.

## **Utilization and Dissemination of Findings**

The results of this work were used to revise the CBEF. Less predictive scales were dropped and new ones were added. Also, the self-report criteria in the initial study proved highly useful and have now been expanded in a new self-report criterion measure that assesses Cadets' attitudes towards school, ROTC, and the Army. ARI and Cadet Command are planning data collections with additional cohorts of ROTC four-year scholarship recipients. In the end, this project will provide a rich source of data for studying ROTC program completion and Army career continuance beyond the service obligation incurred with ROTC.



**INITIAL DEVELOPMENT AND VALIDATION OF ASSESSMENTS FOR  
PREDICTING DISENROLLMENT OF FOUR-YEAR SCHOLARSHIP RECIPIENTS  
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# INITIAL DEVELOPMENT AND VALIDATION OF ASSESSMENTS FOR PREDICTING DISENROLLMENT OF FOUR-YEAR SCHOLARSHIP RECIPIENTS FROM THE RESERVE OFFICER TRAINING CORPS

## Chapter 1. Overview

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### *Background*

The Reserve Officer Training Corps (ROTC) is clearly an essential commissioning source for the U.S. Army. ROTC has recently produced the majority of the Army's new Officers (Wiedemann, 2005) and yields Officers that eventually reach the highest ranks. For example, in 2005, approximately half of General Officers were ROTC graduates while approximately one-third came from the U.S. Military Academy (USMA).

The Army offers several avenues to Army ROTC. Qualified high school seniors or current college students may apply for two-, three-, or four-year scholarships. In each case, students must meet physical and academic standards. Enlisted Soldiers can earn a commission as an Army Officer through the Army Green to Gold program. This program has two options—a scholarship option for Soldiers who are considering leaving active duty to attend college and an active duty option for Soldiers who want to remain on active duty and attend college. Army ROTC students who receive an Army ROTC scholarship must agree to complete a period of service with the Army.

Analyses have indicated that Officers graduating from the four-year ROTC scholarship program tend to be more likely than their USMA, Officer Candidate School (OCS), and non-scholarship ROTC counterparts to leave after their initial Active Duty Service Obligation (ADSO; Doganca, 2006). Furthermore, relative to non-scholarship Cadets, four-year scholarship Cadets tend to be less likely to complete the ROTC program and become commissioned Officers. Data collected for the current project showed that approximately 10.3% of four-year scholarship freshmen in 2007 disenrolled between their freshman and sophomore years (see Chapter 3). For these reasons, the U.S. Army Cadet Command needs a valid, reliable measure to use in awarding scholarships to individuals who are likely to complete their programs. Toward that end, the U.S. Army Research Institute (ARI) for the Behavioral and Social Sciences initiated a research project to develop and validate an instrument to improve selection of four-year scholarship recipients.

### *The Four-Year High School Scholarship Program Application and Selection Process*

Most students who apply for a four-year scholarship do so during their junior or senior year of high school. Each applicant who qualifies for the program based on college

entrance exam scores, high school grade point average (HS GPA), and date-of-birth requirements is interviewed by a Professor of Military Science (PMS). Offers are made to applicants on the basis of their application data, interview results, and an overall evaluation by a selection board. The specific steps in the selection process are listed in Figure 1.1.

---

1. A high-school student completes an application for a scholarship.
2. The applicant is considered “eligible,” if s/he meets three criteria:
  - Has a HS GPA of 2.5 or greater
  - Has an ACT $\geq$  19 or an SAT $\geq$ 920
  - Meets date-of-birth eligibility
3. Every few weeks after this “eligibility” determination is made, Cadet Command identifies a set of eligible applicants to interview. Not every eligible applicant is interviewed at once; they are interviewed in cycles.
4. Eligible applicants are interviewed by the Professor of Military Science (PMS) at the school closest to the home of record, regardless of the colleges to which they have applied. Interviews may be conducted in person or over the phone.
5. PMS interviewers complete an interview form and return the form to Cadet Command.
6. Once a sizable number of interviews are completed for eligible applicants, Cadet Command holds selection boards to determine which applicants will be extended scholarship offers. The decision to award scholarship is based on the sum of three sets of points: (a) points awarded to the applicant based on the PMS interview, (b) points awarded to the applicant based on “Whole Person Scores” (WPS) derived from his/her scholarship application, and (c) “board points” awarded to the applicant based on the selection board’s review of the applicant’s entire package.<sup>1</sup>
7. Based on the aforementioned selection board, Cadet Command extends offers in a top down fashion based on total points. The number of scholarships awarded in any given promotion board cycle varies, and depends on myriad factors (e.g., quality of the applicants, slots to be filled, funds remaining, etc.). In awarding the scholarship, Cadet Command will make the offer good for up to three schools to which the applicant had applied for admission. Limiting the choice of schools serves to cap the amount of scholarship money that Cadet Command will spend on an applicant. If the applicant failed to get into any of the schools on the list, or wishes to attend another school, the applicant must contact Cadet Command to see if an accommodation can be made. Applicants who do not receive an offer in the initial selection board, are reconsidered by subsequent selection boards (though their total points are not recalculated).
8. Once the offer is made, the applicant has 30 days to accept or decline the offer. If the applicant does not respond, the offer is withdrawn.
9. The next step in the process is enrollment. The applicant enrolls in the ROTC program upon arriving on campus, and goes through steps necessary to contract with the Army (e.g., undergo a medical exam to ensure they meet minimum physical requirements, and background check to ensure they meet moral character requirements).

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***Figure 1.1. Overview of the four-year high school scholarship application-selection process.***

---

<sup>1</sup> Whole Person Scores (WPS) reflect points awarded to applicants based on the four-year high school scholarship application form. Points are awarded for (a) college board scores (i.e., SAT/ACT scores), (b) high school GPA, and (c) extracurricular activities (e.g., participation and/or leadership positions held in student government, sports, clubs) (Cadet Command Pamphlet 145-1).

## ***Overview of Approach***

The short-term goal of this project was to develop a new measure that improves the prediction of ROTC continuance for four-year scholarship recipients, beyond the level of prediction already afforded by the current scholarship award process. The long-term objective of this project is to provide the foundation for future longitudinal research that examines the impact of the new measures for predicting ROTC program completion, commissioning, and career continuance in the Army.

With those objectives in mind, ARI developed a new measure to improve scholarship recipient selection—the Cadet Background and Experiences Form (CBEF). The initial version of the CBEF had two primary parts: the Rational Biodata Inventory (RBI) and the Propensity for Commitment (PFC) scales. In addition, early indicators of ROTC and Army career continuance were included to provide a preliminary assessment of the criterion-related validity of the CBEF. In the spring of 2007, ARI and Cadet Command administered the CBEF to freshman, four-year scholarship recipients. ARI contracted with the Human Resources Research Organization (HumRRO) to (a) analyze data arising from this data collection, (b) evaluate the CBEF’s functioning and potential for predicting disenrollment, and (c) make revisions to the CBEF to improve its potential for identifying applicants at heightened risk of subsequent disenrollment.

## ***Organization of the Report***

Chapters 2 through 5 of this report describe the initial development and validation of the CBEF. Specifically, Chapter 2 discusses the development of the CBEF. Chapter 3 discusses the administration of the CBEF to four-year scholarship recipients in their freshman year of Military Science (MS-1) during the spring of 2007, as well as the development of the validation database. Chapter 4 discusses the basic psychometric properties of the CBEF and key validation criteria used in this effort (e.g., disenrollment). Chapter 5 examines criterion-related validity for the CBEF, as well as Whole Person Scores (WPS) derived from the four-year scholarship application. Last, Chapter 6 describes additional efforts underway to examine the psychometric properties and functioning of the CBEF and future research plans.



## **Chapter 2. Development of the CBEF**

Robert Kilcullen, Jordan Robbins, & Trueman Tremble  
U.S. Army Research Institute for the Behavioral and Social Sciences

In an effort to assist the Cadet Command with its initiative to reduce disenrollment of Army ROTC four-year scholarship recipients, ARI developed the Cadet Background and Experiences Form (CBEF). The CBEF was designed as a tool to potentially augment the selection criteria currently used by Cadet Command to make scholarship decisions (e.g., Whole Person Scores based on the four-year scholarship application, PMS interview scores, selection board points). The purpose of this chapter is to describe the development of the CBEF.

As noted in Chapter 1, the CBEF developed for the current effort had two primary parts: a modified version of the Rational Biodata Inventory (RBI) for use with ROTC Cadets and the Propensity for Commitment (PFC) scales. The modified RBI measured temperament constructs hypothesized to relate to ROTC disenrollment and Officer continuance. Part II of the CBEF, the PFC, consisted of 41 contrasting pairs of statements designed to scale respondents' propensity for commitment. In addition to the RBI and PFC, the CBEF also included several items to help evaluate the functioning of the RBI and PFC scales. These comprised 11 questions that asked respondents about (a) their participation in Junior ROTC (JROTC), (b) when they began considering enrolling in ROTC, (c) factors that influenced their decision to join ROTC, and (d) their self-rated likelihood of completing ROTC, becoming a commissioned Officer, and making the Army a career.

### ***The Rational Biodata Inventory (RBI)***

The RBI was included in the CBEF test battery because it has been a consistent predictor of both Soldier job performance and attrition in previous research (Kilcullen, Putka, McCloy, 2007; Klopp, 2006; Putka & Bradley, 2008; Putka, Kilcullen, & White, 2003). Rational biodata scales such as the RBI are designed to measure temperament constructs using questions about past behavior and life experiences. Temperament constructs were targeted for measurement with the original version of the RBI based on a job analysis of the competencies required of future Soldiers (Sager, Russell, R.C. Campbell, & Ford, 2005), as well as a review of the constructs measured by other biodata tests developed by ARI, particularly the Assessment of Right Conduct (ARC) and the Test of Adaptable Personality (TAP) – that predict both counterproductive behavior and job performance in the Army (Kilcullen, Goodwin, Chen, Wisecarver, & Sanders, 2002; Kilcullen, Mael, Goodwin, & Zazanis, 1999; Kilcullen, White, Sanders, & Hazlett, 2003). A detailed description of the development of the RBI is provided by Kilcullen, Putka, McCloy, and Van Iddekinge (2005).

The RBI can be tailored to measure different temperament constructs of interest to a given population. Two new RBI scales were developed for use with ROTC Cadets: Educational Identification and Impulsiveness. The idea behind the Educational Identification scale was that some Cadet disenrollment could be due to Cadets dropping out of college, which may be largely motivational (e.g., not attending class). The Impulsiveness scale was

added because some Cadets might accept the scholarship or make the decision to leave without thinking through the decision. The RBI administered in this effort (see Figure 2.1) consisted of 12 predictor scales and a Response Distortion scale that detected whether the respondents were describing themselves in an overly favorable light (i.e., in a way that may not reflect their true standing on the constructs of interest on the RBI). A sample RBI item appears in Figure 2.2.

---

**Peer Leadership:** Seeks positions of authority and influence. Comfortable with being in charge of a group. Willing to make tough decisions and accept responsibility for the group's performance.

**Cognitive Flexibility:** Willingness to entertain new approaches to solving problems. Enjoys creating new plans and ideas. Initiates and accepts change and innovation.

**Achievement Orientation:** The willingness to give one's best effort and to work hard towards achieving difficult objectives.

**Fitness Motivation:** Degree of enjoyment from participating in physical exercise. Willingness to put in the time and effort to maintain good physical conditioning.

**Interpersonal Skills – Diplomacy:** Being extroverted and outgoing. Able to make friends easily and establish rapport with strangers. Good at meeting/greeting people.

**Stress Tolerance:** Ability to maintain one's composure under pressure. Remaining calm and in control of one's emotions instead of feeling anxious and worried.

**Hostility to Authority:** Being suspicious of the motives and actions of legitimate authority figures. Viewing rules, regulations, and directives from higher authority as punitive and illegitimate.

**Self-Efficacy:** Feeling that one has successfully overcome work obstacles in the past and that one will continue to do so in the future.

**Cultural Tolerance:** Willingness to work with people of different cultures. Being able to establish supportive work relationships with people of a variety of racial and ethnic backgrounds.

**Army Identification:** The degree of personal identification with, and intrinsic interest in becoming, a U.S. Army Soldier.

**Educational Identification:** Desire for a college degree. Perceives self as someone who will complete college.

**Impulsiveness:** The tendency to act without thinking beforehand.

**Response Distortion:** This scale is not a predictor scale. Its purpose is to detect and adjust for socially desirable responding. (7 items)

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***Figure 2.1. ROTC Rational Biodata Inventory (RBI) scales.***

---

How often have you put off doing a chore that you could have taken care of right away?

- A. Very often
  - B. Often
  - C. Sometimes
  - D. Seldom
  - E. Never
- 

***Figure 2.2. Sample RBI item.***

### ***Development of the Propensity for Commitment (PFC) Scales***

Commitment is commonly thought to be a psychological state that represents the nature of the employees' relationship with a given organization and that influences whether they choose to continue at that organization (Meyer & Allen, 1991, 1997). This



conceptualization of commitment is useful in understanding the extent to which an individual is committed to an organization at any given point in time, but it offers only a snapshot of an individual's current commitment state and says little about an individual's dominant tendencies towards organizational/group continuance behavior. Furthermore, Mowday, Porter, and Steers (1982) point out that commitment prior to organizational entry may be meaningless because actual commitment to remain in an organization exists only after one has entered the organization. Thus, while commitment remains one of the most important predictors of retention, it may not be well suited for selection contexts.

Researchers have suggested that individuals may differ in the extent to which they are dispositionally inclined to become committed to a group (Mowday et al., 1982). Although this topic has received relatively little attention in the psychological literature (e.g. Lee, Ashford, Walsh, & Mowday, 1992; Mowday et al., 1982; Wolf & Betz, 2004), it has the potential to remedy the problems of using commitment in selection contexts. For example, individuals can have the tendency to orient themselves towards a group or persist in their group memberships even prior to joining a given group. Expanding on this area of research, ARI began in a prior study to examine an individual's dominant tendencies towards organizational/group continuance behavior as a potential predictor measure that could be administered to applicants prior to organizational entry. More specifically, ARI raised the possibility that people differ with respect to their base-level propensity for commitment (PFC). ARI proposed further that individuals stronger in their base-level PFC and voluntarily entering an organization are more likely to become committed to and remain in the organization.

Propensity for commitment (PFC) was conceptualized as an individual's generalized tendency to become committed to a group or organization. Individuals high in PFC should strive to seek out social bonds or relationships, socially immersing and integrating themselves into a group in order to feel as if they are part of something larger than themselves, and to persist in these relationships once they are formed.

### ***Initial Item Development and Pilot Test***

The PFC is an experimental measure developed in an unpublished pilot test conducted by ARI prior to the study described in this report. The initial scale consisted of thirty-six bipolar items, designed to tap individuals' generalized values, reactions, and justifications regarding their tendency to: (a) seek out others and work well as a group member, (b) identify with and internalize their membership in a group, and (c) persist in group membership. The prior study piloted the PFC on 294 junior Officers taking part in the Basic Officer Leadership Course at Fort Benning. Confirmatory factor analysis indicated that the measure was composed of two factors that were labeled Persistence and Group Orientation. The Group Orientation dimension refers to an individual's tendency to seek out and affiliate with a group, while the Persistence dimension refers to a tendency to persist in one's group membership and to see oneself as a group member regardless of the circumstances. The internal consistency (inter-item) reliabilities for these scales were marginal, having coefficient alphas between .57 and .62. Nevertheless, the scales seemed to have modest convergent and discriminant validity with other measures such as Need for

Belonging, Need for Identification, Organizational Commitment, Intent to Remain in the Army, and the Big Five personality traits (Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). In sum, the relatively low reliabilities suggested that further work would be needed to ensure that the scales are tapping the constructs of interests.

Based on results and feedback received from the prior pilot test, ARI took steps to improve the PFC for administration in the spring of 2007. For example, instructions were modified to clarify potential points of confusion regarding the use of the scales. Items were modified that seemed to be possibly confusing, and new items were added. The revised PFC consisted of 41 pairs of statements. One statement in each pair was hypothesized to reflect low standing on the target construct of interest (e.g., Group Orientation), and the other statement in the pair was hypothesized to reflect high standing on the target construct of interest. As shown in Figure 2.3, respondents were asked to respond to each pair of statements using a semantic differential-like scale (Snider & Osgood, 1969).

---

The boxes in each row below present you with two opposing statements. Mark each row in the way that best describes you. For example, assume you were presented with the following:

**I feel happy** ( ) ( ) ( ) ( ) ( ) **I feel sad**

If you are typically a very happy person you would mark your answer on the scale as follows:

**I feel happy** (X) ( ) ( ) ( ) ( ) **I feel sad**

If, on the hand, you are typically feel somewhat sad, you would mark your answer as:

**I feel happy** ( ) ( ) ( ) (X) ( ) **I feel sad**

Please be aware that the contrasting statements will be different for each question. The closer a mark is to a given statement, the greater it indicates your agreement with that statement. Please read both statements on a given row before indicating your response.

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***Figure 2.3. PFC instructions.***

### ***Additional Items on the CBEF***

As noted earlier, in addition to the RBI and PFC scales, the CBEF also included several items to help evaluate the functioning of said scales. These items asked respondents about:

- Participation in the junior ROTC program.
- Importance of various factors (e.g., pay for college, please Family) in making the decision to enroll in ROTC.
- Likelihood that the Cadet will complete ROTC and become a commissioned Officer.
- Likelihood that the Cadet will make the Army a career.

As described in Chapter 4, Cadets' responses to the latter two items, along with their enrollment status (obtained from archival Cadet Command records) served as preliminary criteria when evaluating the RBI and PFC scales. Specifically, these were administered to

Cadets who completed the CBEF so we could examine whether RBI and PFC scales could predict early indicators of ROTC and Army career continuance.



## Chapter 3. Administration of the CBEF and Development of the Validation Database

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In the spring of 2007, over 1,900 copies of the Cadet Background and Experiences Form (CBEF) along with administration instructions were distributed to Professors of Military Science (PMSs) at over 250 colleges across the country. The goal of distributing these packets was to have PMSs administer the CBEF to all four-year high school scholarship recipients enrolled in their freshman year of military science (MS-1). This chapter discusses the process of administering the CBEF to these Cadets, as well as subsequent construction of a database designed to support the validation of the measure. This database reflected not only data collected from the aforementioned Cadets during the spring 2007 administration of the CBEF, but also archival data from Cadet Command that contained these Cadets' application data (e.g., their Whole Person Scores), as well as their enrollment status as of the fall of 2007.

### *Administration of the CBEF*

The PMSs played a critical role in administering the CBEF. Along with the copies of the CBEF described above, PMSs were provided with rosters of Cadets believed to (a) have four-year scholarships, and (b) be in their freshman year of college. In preparation for the testing sessions, PMSs were asked to review and update a roster of four-year freshman scholarship recipients, become familiar with the study and materials, and make arrangements for testing.<sup>2</sup> The PMSs then administered the CBEF to the MS-1 Cadets in their jurisdiction. For future reference, the specific instructions PMSs were given for preparing for and conducting the data collection sessions are presented in the appendix of this report.

### *Development of the Validation Database*

Data from the CBEF administration were key-entered and merged with archival data from Cadet Command to form the validation database. This section provides details of those steps.

#### *The CBEF Dataset*

As mentioned, the CBEF was administered to freshman Cadets in paper-and-pencil form. ARI key-entered the raw data and provided electronic CBEF data to HumRRO. HumRRO assessed the accuracy of ARI key-entry by re-keying the 151 variables in the CBEF for 150 respondents randomly selected by ARI. HumRRO project staff then electronically compared our key entry to that of ARI and examined hard copies of surveys in

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<sup>2</sup> Rosters provided to each PMS were based on data provided by Cadet Command.

all instances where variable values differed between ARI and HumRRO key-entry. Results of this effort indicated an ARI key entry error rate of less than one half of one percent. Satisfied with the level of accuracy in ARI data entry, HumRRO edited CBEF data to correct the key entry errors discovered during the aforementioned assessment of ARI data entry and created an analysis CBEF dataset comprising data for 1,571 Cadets from 225 schools. Given that approximately 1,900 questionnaires were originally distributed across 256 schools, this represents an individual-level response rate of approximately 82.7% and a school-level response rate of 87.9%. One should take caution, however, when interpreting these response rates as PMSs at each school had the discretion to prune back or add to the initial roster of Cadet's targeted for questionnaire distribution. For example, PMSs at a given school would have eliminated a Cadet's name from the distribution list if that Cadet was no longer enrolled in the ROTC program as of the spring of 2007.

### ***Cadet Command Data***

Archival data on Cadets was extracted from two databases maintained by Cadet Command: the Applicant Database and the Student Management Database. The Applicant Database contains myriad data, including data from the ROTC four-year high school scholarship application. This includes a variety of information from the applicant, such as high school grades, SAT/ACT scores, and participation in high school activities. This information is used to create a number of composites, and ultimately, "Whole Person Scores" for each applicant, which play a key role in the scholarship awarding process (see Chapter 1). In August of 2007, Cadet Command provided electronic data from the Applicant Database for all four-year high school scholarship Cadets who first enrolled during the 2006-2007 school year (i.e., SY06-07). This file included information on applicant demographics, high school courses and standing, test scores, academic and ROTC school preferences, academic major, composite scores and a code that indicates the status of the applicant's scholarship (i.e., accepted, declined, or withdrawn). It contained records describing 9,027 individual applicants. In the final dataset, we retained all "accepted" applicants—the 1,695 applicants coded in the Application Database as having accepted a four-year high school scholarship.

The second database, the Student Management Database, tracks students once they enroll in ROTC courses in college. It contains data required for the student to contract with the Army in the final step of the admittance process (e.g., age, dependents) and key variables, such as enrollment status, disenrollment reason (if disenrolled), Army Physical Fitness Test (APFT) scores, and grade point average (GPA). In October 2007, Cadet Command provided an extract from the Student Management Database that contained the latest status for four-year high school scholarship Cadets who first enrolled during SY06-07.

We merged the student management data with applicant data to create the final Cadet Command dataset. It is important to note that the two Cadet Command databases were developed independently and serve different purposes. Consequently, the transition between the two is not simple. For example, only those applicants who accept an offer (as indicated in the Applicant Database) and then actually enroll for their freshman year actually appear in the Student Management Database. The final merged file included data from the two merged files on all 1,695 cases that had been coded as accepting a scholarship.

### ***The Validation Database***

The CBEF dataset and the Cadet Command dataset were merged to produce a datafile to support all analyses (i.e., the validation database). The resulting validation database comprised records for 1,068 Cadets. Recall that CBEF data were available for 1,571 Cadets, and 1,695 Cadets had accepted four-year high school scholarship offers according to Cadet Command's Applicant Database. Merging these datasets revealed that 503 (32%) of Cadets with CBEF data did not appear in Cadet Command's database as four-year *high school* scholarship recipients. When this finding was shared with Cadet Command, they indicated that it was within reason that about one-third of Cadets who completed the CBEF in the spring of 2007 were part of a program (on-campus or Green-to-Gold) other than the high school scholarship program. As such, we restricted the validation database used here to those Cadets who (a) completed the CBEF as part of the spring of 2007 data collection and (b) accepted four-year *high school* scholarship offers based on the SY06-07 application data.

Table 3.1 presents basic demographic information for full set of 1,068 Cadets comprising the validation database. As Table 3.1 shows, the majority of the sample was male (78.2%) and White (85.3%). Comparison of these numbers to characteristics of applicants who accepted offers for four-year high school scholarships for SY06-07 (based on Cadet Command records) revealed a great deal of similarity. For 78.1% of applicants who accepted four-year high school scholarships for SY06-07 were male, 82.7% were White, and 5.9% were Black.

With the validation database constructed, we next screened the CBEF data for missing data (i.e., no more than 10% missing on either the RBI or PFC), as well as random responding. This screening eliminated CBEF data for 34 of 1,068 Cadets (3.4%) in the validation database. A final screen was done to ensure that individuals who disenrolled prior to the administration of the CBEF were excluded from analyses (resulting in the elimination of two additional cases).

***Table 3.1. Demographic Composition of Cadets in the Validation Database***

Variable	Category	<i>N</i>	%
Gender	Female	233	21.82
	Male	835	78.18
Race	White	911	85.30
	Asian	84	7.87
	Hispanic	68	6.37
	Black	55	5.15
	Other	33	3.09
	American Indian	20	1.87
	Hawaiian	16	1.50

*Note.* Applicants could designate more than one race.



## Chapter 4. Basic Psychometric Properties of the CBEF and Key Criterion Measures

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This chapter describes basic psychometric properties of the CBEF, based on the sample of Cadets who completed the measure in the Spring of 2007. Additionally, we describe the standing of these Cadets on key criteria that will provide the basis of criterion-related validity analyses described in Chapter 5.

### *Scoring of the RBI and CBEF Components of the CBEF*

Prior to performing any analyses on the RBI and PFC, we scored Cadets' responses to each of the items on these components of the CBEF and aggregated item scores into scale scores (described in Chapter 2). The scoring of the RBI was straightforward. Cadets responded to each item using a 5-point scale (ranging from 1 to 5), and items pertinent to each RBI scale (see Figure 2.2) were reverse coded as needed and averaged together to form RBI scale scores.

The scoring of the PFC was not quite as straightforward, due in part to the novelty of the measure, and nature of how its items were scaled. Therefore, we conducted several analyses to refine the PFC item pool and scale the items.

Initially, we conducted a parallel analysis to estimate the number of factors needed to explain the variance in the PFC items. These analyses were conducted among all Cadets who completed at least 90% of the PFC items as part of the Spring 2007 data collection ( $N = 1,550$ ). We found that about 15 factors would be needed to explain *all* of the variance in items.<sup>3</sup> Even so, we found that the first two or three factors accounted for the majority of the common variance (i.e., the first two factors account for 57% of this variance, and the first three factors account for 67%).

Next, we used a series of Rasch analyses (1-parameter IRT model) to determine whether the PFC should be scored on one scale (e.g., total score) or more than one scale (e.g., Persistence and Orientation) and found that more than one scale was needed. In the first Rasch analysis, we included all 41 items. Based on this initial analysis, Item 9 was eliminated because it had extremely poor statistics (e.g., it had a negative item-total correlation). Other items fit poorly, though not so poorly that they warranted exclusion from subsequent diagnostic analyses. Six persons were also dropped based on this analysis because their responses were very inconsistent with predicted Rasch model values. After dropping this

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<sup>3</sup> A parallel analysis compares the research data with random data to estimate the number of factors underlying the data. The factor analyses used multiple-squared correlations as the initial communality estimates. The iterated principal factor method was used to extract the factors. The scree plot (i.e., plot of each eigenvalue vs. its factor number) from the research data was compared with the scree plots of 100 random samples possessing the same number of items (41) and the same sample size (Listwise  $N = 1460$ ) as the research sample. For each research/random pair, the number of factors indicated by the parallel analysis is the factor number just before the two scree plots cross. Among the 100 random samples, 37 indicated 14 factors and 63 indicated 15 factors. Thus, about 15 factors were needed to recover the common variance present in the items.

item and these persons, 40 items and 1,544 persons remained. A principal components analysis of the residuals revealed that the Rasch (first) factor accounted for only 37% of the measured variance, and there here were two meaningful residual factors that accounted for 6.9% and 6.0% of the unexplained variance, respectively. This pattern of findings indicates that a single scale for the 40 items would be inappropriate.

Next, we conducted separate Rasch analyses to assess and refine two factors that appeared to account for covariance among PFC items—Persistence and Group Orientation.<sup>4</sup> After several iterations of identifying the Persistence items with the worst fit (for a single Persistence factor solution), nine items were dropped because of poor fit statistics. The estimated reliability of the remaining 10 items was just slightly lower (.68) than for the original 19 items (.70). In the same way, nearly half of the items in the Group Orientation scale were dropped. The scale decreased from 21 items to 12 items, but its estimated reliability dropped only slightly, from .79 to .78.

In sum, the revised version of the PFC Persistence and Group Orientation scales was shortened considerably, but retained most of the reliability of the original length PFC. The final scores for the PFC were computed using only the final 22 items. Rasch scores and summated scores differ in two respects. First, Rasch scores are typically scaled so that most of the scores are between -3 and +3. Second, a Rasch scale tends to be stretched out near the upper and lower ends. Thus, the relationship between the summated PFC scores and the Rasch scores is nearly linear except at the low end and the high end. Before analyzing the data, the Rasch scores were rescaled so that they were as similar as possible (in terms of their means and standard deviations) to the summated scores. For example, the *rescaled* Rasch and summated scores have the same means and very similar standard deviations. The Rasch scores were correlated .97 with the summated scores. Thus, the results of the analyses would have been only trivially different if summated scores had been used. Nevertheless, for this effort we adopted the Rasch scoring, as it will tend to make more of a difference in the upper and lower ends of the score distribution, where selection decisions (both screen in, and screen out) tend to be made. The PFC scales reported in the remaining sections of this report were scored as are as follows:

$$\text{Rescaled PFC Persistence} = 33.78261 + 8.695652 * \text{Rasch Score} \quad (1)$$

$$\text{Rescaled PFC Group Orientation} = 36.42857 + 9.52381 * \text{Rasch Score} \quad (2)$$

### ***Basic Properties of the RBI and PFC Components of the CBEF***

#### ***RBI and PFC Scale Statistics***

RBI and PFC scale means, standard deviations, and internal consistency (inter-item) reliabilities appear in Table 4.1. In general, the RBI and PFC scales show acceptable variance

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<sup>4</sup> The decision to refine a two factor solution as opposed to a three factor solution was based on the fact that (a) two factors were found to underlie PFC items during its initial pilot testing (see Chapter 2), and (b) the evidence for the existence of a meaningful third factor was not deemed strong enough to warrant its addition.

and reliability. An exception was the Educational Identification scale (EDID), which showed relatively low reliability ( $\alpha = .49$ ), indicating that further work is needed on the development of this scale. We should note that although the Response Distortion scale items exhibited little internal consistency, this was expected. The items on this scale were not hypothesized to be reflective of a “response distortion” construct, but rather formative indicators of it (MacKenzie, Podsakoff, & Jarvis, 2005). As noted by previous researchers, notions of inter-item consistency for such formative measures have little meaning (Bollen & Lennox, 1991)—we report a reliability for the Response Distortion scale here only for purposes of contrasting results with the other RBI scale.

Table 4.1 also shows correlations among the CBEF scales. On average, the RBI scales were minimally to moderately correlated with (a) each other (*Mean*  $r = .15$ , *Min*  $r = -.30$ , *Max*  $r = .54$ ), and (b) the two PFC scales (*Mean*  $r = .14$ , *Min*  $r = -.12$ , *Max*  $r = .40$ ). The strongest correlations among RBI scales were among the Peer Leadership, Achievement Orientation, Self-Efficacy, and Educational Identification scales (all were positively correlated). The strongest correlations between RBI and PFC scales were for: RBI Interpersonal Skill and PFC Group Orientation ( $r = .40$ ), RBI Achievement and RBI Army Identification with PFC Persistence ( $r$ 's =  $.30$  and  $.31$  respectively). The pattern of correlations described above is consistent with a priori expectations and helps reinforce claims that these measures are assessing the constructs they were designed to measure. Lastly, the correlation between the two PFC scales was  $.39$ —suggesting that Persistence and Group Orientation were tapping distinct elements of the propensity for commitment.

In addition to examining relationships among CBEF scales, we also examined their relationship to Whole Person Scores (WPS) derived from the four-year scholarship application form. Recall, that the WPS play a key role in the awarding of scholarships. Thus, it is important to examine the relation between CBEF scales and WPS to determine potential redundancy of the CBEF scales. If CBEF scales are redundant with WPS, their utility for complementing WPS as a potential predictor of disenrollment would be limited. As shown in Table 4.2, there was very little overlap between the WPS and the CBEF scales, based on raw correlations ( $r = .01$  to  $.15$ ). It is important to note that the low raw correlation between the CBEF scales and WPS was, in part, due to the range restriction on the WPS. For example, the average WPS among the sample of freshmen completing the CBEF was 237.58, with a standard deviation of 40.22, whereas the average WPS among all SY06-07 applicants was 152.62 with a standard deviation of 107.24. As such, the sample being used in these analyses was subject to a substantial amount of range restriction. As Table 4.2 reveals, when the range restriction in WPS was accounted for, the CBEF-WPS correlations increased dramatically but not to the level that would suggest that any given CBEF scale was redundant with the WPS.

**Table 4.1. RBI and PFC Scale Means, Standard Deviations, Reliabilities, and Intercorrelations**

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. RBI: Peer Leadership (PLEAD)	.72														
2. RBI: Cognitive Flexibility (CF)	<b>.45</b>	.77													
3. RBI: Achievement Orientation (ACH)	<b>.47</b>	<b>.40</b>	.71												
4. RBI: Fitness Motivation (FM)	<b>.29</b>	<b>.12</b>	<b>.25</b>	.77											
5. RBI: Interpersonal Skills - Diplomacy (ISDIP)	<b>.43</b>	<b>.25</b>	<b>.32</b>	<b>.17</b>	.80										
6. RBI: Stress Tolerance (ST)	<b>.12</b>	<b>.08</b>	.00	<b>.22</b>	<b>.22</b>	.68									
7. RBI: Hostility to Authority (HOST)	-.01	<b>-.09</b>	<b>-.21</b>	.03	-.04	<b>-.30</b>	.61								
8. RBI: Self-Efficacy (SE)	<b>.54</b>	<b>.42</b>	<b>.54</b>	<b>.45</b>	<b>.35</b>	<b>.30</b>	<b>-.13</b>	.77							
9. RBI: Cultural Tolerance (CT)	<b>.29</b>	<b>.40</b>	<b>.24</b>	<b>.11</b>	<b>.33</b>	<b>.18</b>	<b>-.21</b>	<b>.32</b>	.74						
10. RBI: Army Identification (AI)	<b>.26</b>	<b>.11</b>	<b>.20</b>	<b>.32</b>	<b>.15</b>	<b>.21</b>	<b>-.12</b>	<b>.31</b>	<b>.14</b>	.78					
11. RBI: Impulsiveness (IMP)	<b>.07</b>	-.01	<b>-.12</b>	.06	<b>.09</b>	<b>-.21</b>	<b>.43</b>	.00	-.04	<b>-.09</b>	.62				
12. RBI: Educational Identification (EDID)	<b>.26</b>	<b>.21</b>	<b>.54</b>	<b>.08</b>	<b>.26</b>	.03	<b>-.28</b>	<b>.32</b>	<b>.17</b>	<b>.09</b>	<b>-.13</b>	.49			
13. RBI: Response Distortion (RD)	<b>.13</b>	<b>.15</b>	<b>.22</b>	<b>.10</b>	<b>.12</b>	<b>.18</b>	<b>-.24</b>	<b>.20</b>	<b>.14</b>	<b>.08</b>	<b>-.14</b>	<b>.12</b>	.14		
14. PFC: Persistence (PERSIST)	<b>.27</b>	<b>.15</b>	<b>.30</b>	<b>.20</b>	<b>.10</b>	<b>.09</b>	<b>-.06</b>	<b>.29</b>	<b>.08</b>	<b>.31</b>	<b>-.12</b>	<b>.17</b>	<b>.08</b>	.63	
15. PFC: Group Orientation (GRORIENT)	<b>.15</b>	<b>.08</b>	<b>.20</b>	<b>.11</b>	<b>.40</b>	<b>.12</b>	.01	<b>.17</b>	<b>.16</b>	<b>.15</b>	<b>.06</b>	<b>.13</b>	.05	<b>.39</b>	.75
Mean	3.80	3.64	3.90	3.84	3.89	3.08	1.92	4.21	3.91	4.00	3.08	4.42	0.07	39.76	40.66
SD	0.53	0.62	0.47	0.60	0.69	0.46	0.45	0.44	0.62	0.63	0.50	0.48	0.12	5.62	6.97
No. of Items	6	7	9	7	5	11	7	6	5	7	6	5	2	11	12

*Note:*  $N = 1030 - 1034$ . The response distortion scale includes 7 items; however, 5 items had no variance. Reliabilities indexing consistency among scale items (via coefficient alpha) are on the diagonal. Bold indicates correlation was significant ( $p < .05$ , one-tailed).

**Table 4.2. Correlations between the WPS and RBI and PFC Scales**

CBEF Scale	Correlation with WPS	
	<i>r</i>	<i>r<sub>c</sub></i>
RBI: Peer Leadership (PLEAD)	<b>.09</b>	.24
RBI: Cognitive Flexibility (CF)	<b>.11</b>	.29
RBI: Achievement Orientation (ACH)	<b>.08</b>	.21
RBI: Fitness Motivation (FM)	.04	.10
RBI: Interpersonal Skills - Diplomacy (ISDIP)	.00	.00
RBI: Stress Tolerance (ST)	<b>.07</b>	.19
RBI: Hostility to Authority (HOST)	-.05	-.13
RBI: Self-Efficacy (SE)	.06	.15
RBI: Cultural Tolerance (CT)	.05	.13
RBI: Army Identification (AI)	-.04	-.09
RBI: Impulsiveness (IMP)	<b>-.07</b>	-.18
RBI: Educational Identification (EDID)	<b>.16</b>	.39
RBI: Response Distortion (RD)	<b>-.10</b>	-.25
PFC: Persistence (PERSIST)	.03	.08
PFC: Group Orientation (GRORIENT)	<b>-.09</b>	-.23

Note. *N* = 1030-1034. *r* = Raw correlation. *r<sub>c</sub>* = Correlation corrected for direct range restriction on the WPS (Case 2; Thorndike, 1949). Boldface text indicates raw correlation was significant (*p* < .05, one-tailed).

### **Subgroup Differences**

A particularly important property of any measure being considered to select scholarship winners is whether scores on the measure exhibit mean differences across subgroups (e.g., do males perform differently from females? do Black applicants perform differently from White applicants?). To the extent that sizable differences exist, the measure may be perceived as unfair; thus, we examined the possibility of subgroup differences on the CBEF and WPS here.

Subgroup differences are described in terms of Cohen's *d* effect sizes (Cohen, 1988). Cohen *d* reflects the mean difference in scores on a given measure (e.g., the RBI) across subgroups (e.g., males, females) and is expressed in standard deviation units. Cohen (1988) suggests that *d*'s of .20 in magnitude represent a small difference between groups, .50 a moderate difference, and .80 a large difference. The formula for Cohen's *d* used in the sections that follow is:

$$d = (M_{\text{Non-referent group}} - M_{\text{Referent group}}) / \text{Pooled SD}, \quad (3)$$

where the "referent group" is males for gender comparisons and whites for racial/ethnic comparisons.

### **Gender Differences**

CBEF scale means, SDs, and Cohen's *d* effect sizes for gender comparisons appear in Table 4.3. As shown, effect sizes for gender on the RBI and PFC scales ranged from -.92 to .41 (*Mean d* = -.09). The largest effect sizes were seen for (a) Fitness Motivation, Stress

Tolerance, Army Identification (favoring males), and (b) Achievement and Educational Identification (favoring females), though only Fitness Motivation would be deemed a large effect based on Cohen's (1988) standards. Near zero gender differences were found for Peer Leadership, Cognitive Flexibility, Impulsiveness, and the Response Distortion scale. Males tended to score somewhat better than females on the PFC scales and PFC, but these differences were small. The gender differences observed in this sample are fairly comparable to past research involving the RBI. For example, Kilcullen, Putka, & McCloy (2007) found that first-term male Soldiers tended to have higher RBI Fitness Motivation, Stress Tolerance, and Army Identification scores relative to their female counterparts, and female Soldiers tended to have higher Achievement scores relative to their male counterparts. Thus, the findings here regarding gender differences tended to be relatively small, or at least fairly consistent with past research; the only sizable difference found was for RBI Fitness Motivation.

### *Race/Ethnicity Differences*

CBEF scale means, *SDs*, and Cohen's *d* effect sizes for race/ethnicity comparisons appear in Table 4.4. As shown, effect sizes for race/ethnicity on the RBI and PFC scales ranged from (a) -.58 to .32 for Black-White comparisons (*Mean d* = -.05), (b) -.32 to .34 for Hispanic-White comparisons (*Mean d* = -.07), and (c) -.40 to .51 for Asian-White comparisons (*Mean d* = -.06). With regard to the RBI, moderate effect sizes differences were found between Black and White Cadets on Army Identification, Stress Tolerance, and Fitness Motivation—with White Cadets tending to score moderately higher (*d* = -.49 to -.58). In contrast, Black, Hispanic, and Asian Cadets tended to have slightly to moderately higher scores on RBI Cultural Tolerance (*d* = .20 to .51). With the exception of the differences noted above, only small differences between Cadets of different race/ethnicities were observed on the RBI scales.

Like the gender differences described above, the race/ethnicity differences bear resemblance to past research involving the RBI. For example, Knapp & Tremble (2007) found that White first-term Soldiers tended to have higher RBI Army Identification scores relative to Black Soldiers, but unlike the current sample, White and Black Soldiers tended to score similarly on RBI Stress Tolerance and Fitness Motivation. Additionally, similar to the present sample findings, Kilcullen et al. (2007) found that Black and Hispanic Soldiers tended to have higher scores on RBI Cultural Tolerance relative to White Soldiers. With regard to WPS, White Cadets were found to have moderately higher scores than both Hispanics and Blacks (*d* = .40 and -.57, respectively), and slightly higher scores than Asians (*d* = -.29). Given that the WPS has a large cognitive ability component to it (e.g., College Board scores), and summaries of past research have demonstrated Black-White differences of about .83 standard deviations on measures of cognitive ability (with Whites tending to score higher than Blacks; Schmitt, Clause, & Pulakos, 1996), these findings are well within what would be expected of past research. In sum, no large differences between races on either the CBEF or WPS were found; and when moderate differences were found, they tended to be in line with previous research.

**Table 4.3. RBI, PFC, and WPS Means, SDs, and Effect Sizes by Gender**

Predictor	Male			Female			F-M <i>d</i>
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	
RBI: Peer Leadership (PLEAD)	808	3.79	.53	226	3.84	.56	.09
RBI: Cognitive Flexibility (CF)	808	3.65	.61	226	3.61	.63	-.06
RBI: Achievement Orientation (ACH)	808	3.86	.47	226	4.04	.48	.38
RBI: Fitness Motivation (FM)	808	3.95	.58	226	3.44	.52	-.92
RBI: Interpersonal Skills - Diplomacy (ISDIP)	808	3.84	.68	226	4.04	.68	.29
RBI: Stress Tolerance (ST)	808	3.14	.44	226	2.88	.49	-.56
RBI: Hostility to Authority (HOST)	808	1.95	.46	226	1.84	.40	-.24
RBI: Self-Efficacy (SE)	808	4.23	.43	226	4.15	.45	-.19
RBI: Cultural Tolerance (CT)	808	3.88	.62	226	4.06	.60	.29
RBI: Army Identification (AI)	808	4.05	.61	226	3.83	.67	-.37
RBI: Impulsiveness (IMP)	808	3.08	.49	226	3.05	.53	-.07
RBI: Educational Identification (EDID)	807	4.38	.49	226	4.58	.43	.41
RBI: Response Distortion (RD)	808	.07	.11	226	.08	.13	.07
PFC: Persistence (PERSIST)	804	40.17	5.67	226	38.31	5.18	-.33
PFC: Group Orientation (GRORIENT)	804	40.79	7.03	226	40.19	6.76	-.09
Whole Person Score	808	238.93	40.11	226	232.73	40.36	-.15

Note. F-M *d* =  $(M_{\text{Female}} - M_{\text{Male}})/\text{Pooled Female-Male } SD$ .

**Table 4.4. RBI, PFC, and WPS Means, SDs, and Effect Sizes by Race**

Predictor	White		Black		Hispanic		Asian		<i>d</i>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	B-W	H-W	A-W
RBI: Peer Leadership (PLEAD)	3.82	.52	3.83	.58	3.71	.56	3.71	.61	.02	-.22	-.21
RBI: Cognitive Flexibility (CF)	3.64	.62	3.74	.67	3.54	.67	3.73	.57	.16	-.16	.14
RBI: Achievement Orientation (ACH)	3.90	.47	3.96	.49	3.82	.44	3.89	.51	.11	-.17	-.04
RBI: Fitness Motivation (FM)	3.86	.60	3.56	.68	3.77	.68	3.69	.59	-.50	-.16	-.28
RBI: Interpersonal Skills - Diplomacy (ISDIP)	3.90	.69	3.91	.74	3.85	.62	3.85	.65	.02	-.06	-.06
RBI: Stress Tolerance (ST)	3.11	.46	2.88	.54	3.02	.48	2.93	.46	-.49	-.18	-.40
RBI: Hostility to Authority (HOST)	1.92	.45	1.98	.47	2.00	.50	1.89	.47	.12	.16	-.07
RBI: Self-Efficacy (SE)	4.23	.43	4.15	.48	4.09	.50	4.14	.48	-.18	-.32	-.20
RBI: Cultural Tolerance (CT)	3.89	.63	4.01	.62	4.10	.57	4.20	.49	.20	.34	.51
RBI: Army Identification (AI)	4.03	.62	3.67	.75	4.01	.64	3.89	.68	-.58	-.04	-.22
RBI: Impulsiveness (IMP)	3.07	.50	3.23	.54	3.11	.45	3.10	.55	.32	.08	.07
RBI: Educational Identification (EDID)	4.42	.49	4.48	.42	4.31	.48	4.37	.49	.12	-.22	-.10
RBI: Response Distortion (RD)	.07	.12	.08	.12	.09	.12	.09	.14	.06	.13	.11
PFC: Persistence (PERSIST)	39.96	5.51	38.62	5.91	38.98	6.34	38.96	5.20	-.24	-.18	-.18
PFC: Group Orientation (GRORIENT)	40.65	6.78	41.85	7.85	40.27	7.43	40.64	7.32	.18	-.06	.00
Whole Person Score	240.97	38.31	219.04	37.97	225.56	41.34	229.69	39.37	-.57	-.40	-.29

*Note.* B-W  $d = (M_{\text{Black}} - M_{\text{White}})/\text{Pooled Black-White } SD$ . H-W  $d = (M_{\text{Hispanic}} - M_{\text{White}})/\text{Pooled Hispanic-White } SD$ . A-W  $d = (M_{\text{Asian}} - M_{\text{White}})/\text{Pooled Asian-White } SD$ . *N*s were as follows: 879 to 911 White, 53 to 55 Black, 64 to 68 Hispanic, and 80 to 84 Asian.



### *Basic Properties of Key Criterion Measures*

In the sections that follow, we describe the three criterion variables used to evaluate the predictive potential of the CBEF. The criteria include a Cadet's enrollment status (i.e., disenrolled vs. enrolled as of October 2007) and two self-reported likelihood variables that were included as part of the CBEF administered in the Spring of 2007 (see Chapter 2).

#### *Cadet Enrollment Status*

As described in Chapter 2, the Student Management Database contained variables indicating whether Cadets disenrolled from the ROTC program between their completion of the CBEF in the Spring of 2007, and October 2007. Among those Cadets who completed the CBEF in the Spring of 2007 and had valid records in the Student Management Database, we found that 925 (89.7%) were still enrolled as of October 2007, and 106 (10.3%) had disenrolled as of October 2007.<sup>5</sup>

Based on data provided by Cadet Command, we were able to take a finer grained look at those Cadets who disenrolled. Table 4.5 presents the frequencies for the disenrollment codes for these Cadets.<sup>6</sup> Over half of this sample was noted as disenrolling by their "own request." Such a reason sheds little light on why Cadets requested to disenroll or, pertinent to this effort—can characteristics assessed by the CBEF help identify what types of Cadets are most likely to disenroll? In Chapter 5, we summarize analyses designed to determine whether Cadets' scores on the RBI and PFC components of the CBEF were able to predict which Cadets' disenrolled as of October 2007.

**Table 4.5. Frequency of Reasons for Disenrollment**

Reason Code	<i>N</i>	%
D01: Withdrawal from school	15	14.15
D03: Academic Failure	5	4.72
D11: Transfer to another ROTC program (e.g., Air Force)	1	0.94
D12: Failure to maintain enrollment requirements	2	1.89
D13: Own request	63	59.43
D15: Transfer to another ROTC Battalion	6	5.66
D23: Volunteer Release	2	1.89
D37: Withdrew from ROTC	11	10.38
D39: Academic Dismissal/Suspension	1	0.94
Total	106	100.00

<sup>5</sup> In Chapter 3 we noted there were 1,068 Cadets in the validation database. The numbers cited here add up to 1,031. This difference is explained by the fact that of the 1,068 Cadets in the validation database (a) 35 had no records in the Student Management Database, and (b) 2 Cadets had disenrollment dates suggesting they disenrolled prior to completing the CBEF (logically impossible). As such, the aforementioned 37 Cadets were excluded when calculating the disenrollment criterion variable.

<sup>6</sup> The disenrollment codes presented here should be interpreted very carefully because it has been noted that disenrollment reasons are not reliably and accurately recorded for all Cadets (e.g., Baker, 2006). As such, we do not use these codes for any subsequent analyses. We present them here for informational purposes only.

### ***Self-Rated Likelihood Items from the CBEF***

Although the disenrollment criterion variable was of primary interest in the current effort, there are other criteria that Cadet Command may wish to consider when awarding scholarships—specifically, the likelihood that a prospective Cadet will eventually become an Army Officer and make the Army a career. Unfortunately, establishing a direct relationship between RBI and PFC scales from the CBEF and these variables is not possible based on the current data, as it will take several years to know which of today’s Cadets will eventually become Officers, and in the case of making the Army a career, may take several decades. In light of the limitations of the current data, we included two questions on the CBEF that were designed to serve as proxies for these long-term events, self-rated likelihood of (a) becoming an Army Officer (i.e., completing ROTC) and (b) making the Army a career.

Cadets were asked to rate the likelihood of each event described above on a five-point Likert-type scale (1=Very Unlikely to 5=Very Likely). Analyses of Cadets’ responses revealed that they were highly negatively skewed (i.e., most Cadets chose a response of Likely and Very Likely). Therefore, the response scales were dichotomized for purposes of subsequent validation analyses. The specific dichotomization differed for the two scales because they had different distributions of responses. For example, in the case of the self-rated likelihood of becoming an Army Officer variable, we believed it made more sense to group Cadets who responded using a rating of 1, 2, or 3 into the same category because the number of Cadets who had any one of these responses was very low. In contrast, the “break” in the distribution for the likelihood of making the Army Career variable appeared to come between ratings of 2 and 3, as a relatively small number of Cadets responded using a rating of 1 or 2 on this variable, and a more substantial number of Cadets responded using ratings of 3, 4, or 5. As such, we recoded the self-rated likelihood of becoming an Army Officer variable as: (a) “More Likely” for Cadets who responded using a 5 or 4 on the rating scale (i.e., Very Likely or Likely) or (b) “Less Likely” for Cadets who responded using a 3, 2, or 1 on the rating scale (i.e., Somewhat Likely, Unlikely, or Very Unlikely). We recoded the self-rated likelihood of making the Army a career variable as: (a) “Likely” for Cadets who responded using a 5, 4, or 3 on the rating scale (i.e., Very Likely, Likely or Somewhat Likely) or (b) “Unlikely” for Cadets who responded using a 2 or 1 on the rating scale (i.e., Unlikely or Very Unlikely). Table 4.6 summarizes Cadet’s standing on the dichotomized self-rated likelihood criterion variables.

***Table 4.6. Summary Statistics for Self-Rated Likelihood Criterion Variables***

	<i>N</i>	%
Self-Rated Likelihood of Becoming an Army Officer		
Less Likely	59	5.78
More Likely	961	94.22
Self-Rated Likelihood of Making the Army a Career		
Unlikely	101	9.90
Likely	919	90.10

Although only a small portion of Cadets reported being less likely to become an Army Officer (5.78%) or unlikely to make the Army a career (9.90%), it is noteworthy that even this many Cadets admitted their intentions so early in their ROTC experience. In Chapter 5, we summarize analyses designed to determine whether Cadets' scores on the RBI and PFC components of the CBEF were able to predict Cadets' self-rated likelihood of these events.

As discussed previously, the self-reported likelihood variables offer a possible alternative to actual measures of Cadets' behavior (e.g., becoming an Army Officer) when practical constraints cause the latter data to be unavailable. For example, we will not know if Cadets who completed the CBEF in the Spring of 2007 will actually become Army Officers for at least three more years. Thus, these likelihood variables can provide proxies for actual later behavior. To help assess the quality of the proxies these variables provide, we examined their relationship to Cadets' enrollment status as of October 2007. As seen in Table 4.7, 72.41% of Cadets who indicated that they were less likely to become an Army Officer, subsequently disenrolled. In contrast, only 6.36% of Cadets who indicated they were more likely to become an Army Officer, subsequently disenrolled. This pattern of findings suggests a strong relationship between self-reported likelihood to become an Army Officer and actual disenrollment behavior—even though in the present sample, such behavior potentially occurred several months later.

**Table 4.7. Enrollment Status by Self-Reported Likelihood of Becoming an Army Officer**

Status	Likelihood of Becoming an Army Officer				Total <i>N</i>
	More Likely		Less Likely		
	<i>N</i>	%	<i>N</i>	%	
Enrolled	868	93.63	16	27.59	
Disenrolled	49	6.36	42	72.41	
Total	927	-	58	-	985

Table 4.8 presents parallel results for the likelihood of making the Army a career criterion variable. The results again indicate a strong relationship between self-rated likelihood and subsequent behavior. For example, only 7.55% of Cadets who said they were likely to make the Army a career subsequently disenrolled compared to 35.05% of those who said they were unlikely to make the Army a career. Although this latter number is lower than the 72.41% disenrollment rate among Cadets who indicated they were less likely to become an Army Officer, it is important to note the difference in the substantive content inferred by the two questions. Specifically, all else being equal, we would expect there to be a stronger relation between disenrollment and self-rated likelihood of becoming an Army Officer (i.e., likelihood of *not* disenrolling) relative to more general likelihood of making the Army a career—which may be determined by other factors that do not manifest themselves until after a Cadet graduates (e.g., quality of available civilian job opportunities).

**Table 4.8. Enrollment Status by Self-Reported Likelihood of Making the Army a Career**

Status	Likelihood of Making the Army a Career				Total <i>N</i>
	Likely		Unlikely		
	<i>N</i>	%	<i>N</i>	%	
Enrolled	821	92.45	63	64.94	884
Disenrolled	67	7.55	34	35.05	101
Total	888	-	97	-	985

## Chapter 5. Criterion-Related Validation Results

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This chapter presents criterion-related validity evidence with the intention of evaluating the potential of the CBEF's RBI and PFC scales to predict disenrollment of four-year scholarship recipients, as well as their self-rated likelihood of becoming an Army Officer and making the Army a career. Among the topics discussed here are correlations between the CBEF scales and criteria, logistic regression results, and a discussion of the potential impact that including the CBEF may have on Cadet disenrollment if it were included as part of the scholarship awarding process. We also report on relations between Whole Person Scores (WPS) and the criteria to provide a point of comparison for evaluating relations between RBI and PFC scales and the criteria.

### *Bivariate Relations between Predictor Scales and Criterion Variables*

Table 5.1 presents point-biserial correlations between CBEF predictor scales and criterion variables. Note that interpretation of the magnitude of a point-biserial correlation must take into account the base rate of the dichotomous variable involved in the correlation (e.g., the percentage of Cadets who disenroll). Deviations of the base rate from 50% depress the maximum size of the correlation that be obtained. The 10.3% base rate of disenrollment in the current dataset limited the maximum observable point-biserial correlation to .59 for disenrollment. The maximum correlations for the dichotomized likelihood variables were .50 and .59 for, respectively, becoming an Army Officer and making the Army a career. In light of the sensitivity of point-biserial correlations to base rate, Table 5.1 also presents Cohen's  $d$  effect sizes for each predictor scale-criterion combination (Cohen, 1988). Unlike the point-biserial correlations, the magnitude of Cohen's  $d$  is not affected by the base rate issues and simply reflects the standardized mean difference between predictor scale scores for each group defined by a given criterion variable (e.g., disenrolled Cadets vs. enrolled Cadets, Cadets who indicated they were likely to make the Army a career vs. Cadets who indicated they were unlikely to make the Army a career). Cohen's  $d$  was calculated as follows:

Disenrollment criterion:

$$d = (M_{\text{Disenrolled Cadets}} - M_{\text{Enrolled Cadets}}) / \text{Pooled } SD \quad (1)$$

Likelihood of becoming an Army Officer criterion:

$$d = (M_{\text{"Less likely" Cadets}} - M_{\text{"More likely" Cadets}}) / \text{Pooled } SD \quad (2)$$

Likelihood of making the Army a career criterion:

$$d = (M_{\text{"Unlikely" Cadets}} - M_{\text{"Likely" Cadets}}) / \text{Pooled } SD \quad (3)$$

Two types of Cohen's  $d$  effect sizes are provided for each criterion in Table 5.1. The first type, simply labeled " $d$ ", reflects raw effect sizes unadjusted for range restriction stemming from selection of Cadets on the WPS. The second type, labeled " $d_c$ ", reflects corrected effect

**Table 5.1. Bivariate Relations between Predictors and Criteria**

Predictor	Disenrollment			Likelihood to Become an Army Officer			Likelihood to Make the Army Career		
	$r_{pb}$	$d$	$d_c$	$r_{pb}$	$d$	$d_c$	$r_{pb}$	$d$	$d_c$
Whole Person Score (WPS)	-.04	-.12	-.32	-.01	.05	.13	<b>-.11</b>	.38	1.01
RBI: Peer Leadership (PLEAD)	-.02	-.08	-.14	<b>.09</b>	-.37	-.33	<b>.08</b>	-.26	-.05
RBI: Cognitive Flexibility (CF)	-.01	-.04	-.12	.05	-.19	-.15	.02	-.07	.17
RBI: Achievement Orientation (ACH)	<b>-.09</b>	-.30	-.35	<b>.15</b>	-.63	-.59	<b>.12</b>	-.39	-.19
RBI: Fitness Motivation (FM)	<b>-.10</b>	-.32	-.35	<b>.10</b>	-.41	-.40	<b>.09</b>	-.29	-.19
RBI: Interpersonal Skills - Diplomacy (ISDIP)	.02	.06	.06	.06	-.25	-.25	.03	-.11	-.11
RBI: Stress Tolerance (ST)	-.04	-.13	-.18	<b>.11</b>	-.47	-.44	<b>.07</b>	-.25	-.08
RBI: Hostility to Authority (HOST)	<b>.07</b>	.24	.27	<b>-.09</b>	.38	.36	<b>-.09</b>	.30	.18
RBI: Self-Efficacy (SE)	<b>-.09</b>	-.30	-.34	<b>.13</b>	-.56	-.54	<b>.16</b>	-.54	-.38
RBI: Cultural Tolerance (CT)	.01	.02	-.02	.01	-.03	-.01	<b>.07</b>	-.24	-.12
RBI: Army Identification (AI)	<b>-.19</b>	-.65	-.61	<b>.32</b>	-1.44	-1.45	<b>.40</b>	-1.45	-1.49
RBI: Impulsiveness (IMP)	<b>.08</b>	.28	.33	<b>-.11</b>	.48	.45	-.05	.17	.01
RBI: Educational Identification (EDID)	<b>-.11</b>	-.38	-.46	<b>.13</b>	-.58	-.49	.04	-.14	.21
RBI: Response Distortion (RD)	.05	.15	.22	.01	-.03	-.06	<b>.07</b>	-.23	-.43
PFC: Persistence (PERSIST)	<b>-.08</b>	-.25	-.27	<b>.11</b>	-.49	-.48	<b>.12</b>	-.41	-.33
PFC: Group Orientation (GRORIENT)	-.03	-.09	-.02	<b>.08</b>	-.32	-.34	<b>.06</b>	-.22	-.40

Note:  $N = 995-1020$ .  $r_{pb}$  = Point-biserial correlation.  $d$  = Raw Cohen's  $d$  statistic.  $d_c$  = Corrected Cohen's  $d$  statistic. Boldface text indicates correlation was significant ( $p < .05$ , one-tailed).

sizes that have been adjusted for range restriction stemming from selection of Cadets on the WPS. Recall from Chapter 2, that there was a substantial amount of range restriction in WPS among Cadets in the current sample. Specifically, for example, the standard deviation of WPS scores of freshmen completing the CBEF in the current sample was 40.22, whereas the standard deviation of WPS among all SY06-07 applicants was 107.24. Thus, in an attempt to provide a fairer comparison of the magnitude of relations between RBI/PFC scales and the criteria, relative to the WPS and the criteria, effects sizes were corrected for range restriction using formulae provided by Bobko, Roth, & Bobko (2001).<sup>7</sup>

Based on Table 5.1 the strongest predictors of disenrollment appeared to be RBI Army Identification ( $d_c = -.61$ ) and Educational Identification ( $d_c = -.46$ ), indicating that Cadets who disenrolled scored over  $\frac{1}{2}$  of a standard deviation lower on these scales than those who continued enrollment. The other RBI and PFC scales with statistically significant but relative small relations with disenrollment were RBI Achievement, Fitness Motivation, Hostility to Authority, Self-Efficacy, Impulsiveness, and PFC Persistence ( $d_c$ 's ranging from .27. to .35 in magnitude). We should note that although unadjusted WPS scores were not significantly related to disenrollment, WPS scores adjusted for range restriction exhibited an effect size of -.32 (comparable to the aforementioned RBI and PFC scales). Such an effect size translates into a WPS standard deviation for disenrolling Cadets that was about  $\frac{1}{3}$  lower than the standard deviation for Cadets remaining in the ROTC program.

With regard to the two likelihood criteria, several notable findings emerged. First, there was an extremely large relation observed between the RBI Army Identification scale and both likelihood criteria. For example, Cadets who indicated they were likely to make the Army a career had RBI Army Identification scores that were 1.49 standard deviations higher than scores for Cadets who indicated they were unlikely to make the Army a career. Moderate relations were found between several RBI/PFC scales and the likelihood to become an Army Officer criterion; namely, RBI Achievement, Fitness Motivation, Stress Tolerance, Self-Efficacy, Impulsiveness, Educational Identification, and PFC Persistence all exhibited statistically significant levels of criterion-related validity with relations ranging from .40 to .59 in magnitude (based on corrected  $d$ 's). In general, the pattern of the most predictive RBI-PFC scales for the likelihood to become an Army Officer resembled that for disenrollment. Such findings help reinforce the idea that this self-rated likelihood variable may serve as a useful proxy when evaluating the relative merit of potential predictors of disenrollment.

For the likelihood to make the Army a career criterion, many statistically significant relations were observed, but the effects (with the exception of RBI Army Identification noted above) were far less strong. Some different scales also came up as significant. For example, after RBI Army Identification, the two strongest RBI-PFC based predictors of a Cadet's likelihood of making the Army a career were the RBI Response Distortion and the PFC Group Orientation scale—in both of these cases Cadets who indicated they were likely to make the Army a career tended to have moderately higher scores on these scales relative to Cadets who indicated they were unlikely to make the Army a career. A key finding to note

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<sup>7</sup> Note, when correcting effect sizes for the WPS, we used Bobko et al.'s (2001) formula for direct range restriction, and when correcting effects sizes for RBI and PFC scales, we used Bobko et al.'s (2001) formula for indirect range restriction.

here concerns the effect that correcting for range restriction on the WPS had for the RBI/PFC – likelihood of making the Army career relationships. Specifically, implementing the correction tended to reduce the magnitude of the relationship observed for several RBI/PFC scales. This seemingly unintuitive finding can be explained by the observation that the WPS had a strong negative relation with the likelihood of making an Army a career. Thus, after having accounted for range restriction on the WPS, Cadets likely to make the Army a career had WPS scores which were about one standard deviation lower than those for Cadets who were unlikely to make the Army a career. Such findings stand in contrast to the more positive findings regarding the relation between WPS and disenrollment presented above.

### ***Multivariate Relations between Predictor Scales and Criterion Variables***

In addition to examining bivariate relations between each predictor scale and criterion, we also conducted a series of logistic regression analyses to examine multivariate relations between predictors and criteria. Specifically, such analyses were performed to examine the extent to which (a) composites of RBI and PFC scales could predict each criterion, and (b) RBI and PFC scales could increment the validity of the WPS for predicting each criterion.

Five logistic regression models were fitted for each criterion. In all models, the predictors were standardized prior to being entered into the logistic regression.

- The first model included the WPS as the only predictor of the given criterion. The purpose of this model was to establish a baseline for comparing models that included RBI and PFC scales.
- The second model included only the RBI and PFC scales as predictors of the given criterion. The purpose of this model was to (a) assess the level of criterion-related validity achievable with a regression-weighted composite of RBI and PFC scales and (b) assess the significance of each RBI and PFC scale when considered in a model that included the other RBI and PFC scales.<sup>8</sup>
- The third model included the WPS, RBI, and PFC scales as predictors of the given criterion. The purpose of this model was to (a) assess the level of criterion-related validity achievable with a regression-weighted composite of WPS, RBI and PFC scales and (b) assess the significance of each RBI and PFC scales relative to the WPS.
- The fourth model included a unit-weighted composite of RBI and PFC scales as the sole predictor of the given criterion.
- Last, the fifth model included the WPS and the aforementioned unit-weighted composite of RBI and PFC scales as the sole predictor of the given criterion.

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<sup>8</sup> Note, the “regression-weighted composites” alluded to here and in the next bullet simply reflect the predicted values resulting from fitting the models described in these bullets.



The fourth and fifth models differed from the second and third models in two notable ways. First, they did not include each RBI and PFC scale as a separate predictor, but rather included a single unit-weighted composite of each set of scales. One potential criticism of drawing conclusions based solely on the performance of regression-weighted composites of RBI and PFC scales (i.e., predicted values resulting from models where each RBI and PFC scale was entered as a separate predictor) is that combining scales in such a manner capitalizes on chance. Specifically, when one regresses a criterion on a set of predictors, the regression coefficients (weights) associated with those predictors are “optimized” based on the sample on which the model is fitted. All else being equal, if those weights were applied to the predictor scores (e.g., the RBI-PFC scales) for another sample, the criterion-related validity of the resulting composite would tend to be lower than the criterion-related validity of the composite in which the weights were initially estimated. As such, the first purpose of examining models four and five was to assess the performance of RBI/PFC scales based on a composite that was not optimized based on the sample dataset.

A second difference between the fourth and fifth models relative to the second and third models is that rather than including all RBI and PFC scales, the fourth and fifth models included only those scales that were to be carried forward in a refined version of the CBEF for uses in later efforts on Cadet selection for retention (see Chapter 6). The RBI and PFC scales included in this reduced composite were: RBI Self-Efficacy, Stress Tolerance, Achievement Orientation, Army Identification, Fitness Motivation, Educational Identification, Hostility to Authority, and PFC Group Orientation. Thus, examination of models four and five allowed assessment of a composite formed from the RBI/PFC scales that would be available after refinement of the CBEF.

We summarize results of logistic regression analyses for each criterion using two types of result tables. The first table for a criterion summarizes results for Models 1 through 3, and the second table for the criterion summarizes results for Models 4 and 5 (with Model 1 repeated for purposes of comparison). Tables present *odds ratios* for each predictor in the models of interest. Odds ratios above one indicate that an increase on the predictor variables is associated with an increase in the odds that a Cadet will experience the event of interest (e.g., disenrollment, likely to become an Officer, likely to make the Army a career). Odds ratios less than one indicate that an increase on the predictor is associated with a decrease in the odds that a Cadet will experience the event of interest. For example, if the criterion of interest was disenrollment, an odds ratio of 1.5 for a given predictor would indicate that for every one unit increase on that predictor (holding values for other predictors in the model constant), there would be an associated 50% increase in the odds of disenrollment—i.e., the odds of disenrollment would increase by 1.5 times. Conversely, if the odds ratio was 0.50 for a given predictor, it would indicate that for every one unit increase on that predictor (again, holding values on other predictors in the model constant), the odds of disenrollment would be halved. In addition to odds ratios, result tables also provide Cohen’s *d* statistic for predicted criterion values based on each model. These values reflect the standardized mean difference between predicted scores for Cadets who experience the event of interest (e.g., disenrollment) and those who do not. Specifically, Cohen’s *d* was calculated as follows for each criterion:

Disenrollment criterion:

$$d = (M_{\text{Predicted Score for Disenrolled Cadets}} - M_{\text{Predicted Score for Enrolled Cadets}}) / \text{Pooled } SD \quad (3)$$

Likelihood of becoming an Army Officer criterion:

$$d = (M_{\text{Predicted Score "More likely" Cadets}} - M_{\text{Predicted Score "Less likely" Cadets}}) / \text{Pooled } SD \quad (4)$$

Likelihood of making the Army a career criterion:

$$d = (M_{\text{Predicted Score "Likely" Cadets}} - M_{\text{Predicted Score "Unlikely" Cadets}}) / \text{Pooled } SD \quad (5)$$

### ***Regression Results for Predicting Cadet Disenrollment***

Results presented in Table 5.2 reveal a number of notable findings. First, note that the strongest predictors of disenrollment appear to be RBI Army Identification and Educational Identification. For example, for every one standard deviation increase in RBI Army Identification scores, there was a 69% *decrease* in the odds that a Cadet would disenroll (holding all other predictors, including the WPS, constant).<sup>9</sup> For every one standard deviation increase in RBI Educational Identification scores, there was a 35% *decrease* in the odds that a Cadet would disenroll (again, holding all other predictors constant). The only other RBI/PFC scale that was significantly related to disenrollment when accounting for the effects of the other predictors was the RBI Response Distortion scale. Specifically, for every one standard deviation increase in RBI Response Distortion scale scores, there was a 31% *increase* in the odds that a Cadet would disenroll (again, holding all other predictors constant). Though the Response Distortion scale was not explicitly designed to be a “predictor” of disenrollment, such findings may suggest that high scores on this scale are acting as a proxy for deviance or a propensity to misrepresent oneself—which in turn, may be theoretically related to increased risk for disenrollment from ROTC between one’s freshman and sophomore years.

The other finding of note in Table 5.2 is the increase in criterion-related validity that occurred when the RBI and PFC scales were added to a model containing the WPS only (e.g., Model 1  $d = .14$  vs. Model 3  $d = .99$ ).<sup>10</sup> A comparison of chi-squared fit statistics for these models revealed that this increment in validity was statistically significant ( $\Delta\chi^2 [15] = 60.40, p < .01$ , one-tailed). Further examination revealed that this improvement in validity was attributable to the RBI scales. Specifically, comparison of Model 3 to a model with only the WPS and RBI scales as predictors revealed that addition of the PFC scales to the model failed to significantly increment its validity relative to the reduced model ( $\Delta\chi^2 [2] = 0.46, ns$ , one-tailed).

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<sup>9</sup> When odds ratios are less than one, it is often convenient to “invert” them (i.e.,  $1/OR$ ) for purposes of interpretation. Thus, the 69% value we report here for RBI Army Identification was obtained by taking the OR associated with Army Identification in Table 5.2 ( $OR = 0.59$ ) and inverting it, and expressing it as a percentage change relative 1.00 (i.e.,  $1/.59 = 1.69$ , which equates to a 69% change).

<sup>10</sup> Please note, the incremental validity results presented here and in subsequent sections do not account for range restriction on the WPS. Thus, these results may be viewed as upper bounds for the potential incremental validity of the RBI/PFC scales over the WPS. To our knowledge, no method currently exists for implementing multivariate range restriction corrections when one’s criterion (e.g., disenrollment) is dichotomous in nature.

**Table 5.2. Logistic Regression Results with Disenrollment as the Criterion**

Predictor	Odds Ratios		
	Model 1 (WPS Only)	Model 2 (RBI+PFC)	Model 3 (WPS+RBI+PFC)
Whole Person Score (WPS)	.88	-	.92
RBI: Peer Leadership (PLEAD)	-	1.14	1.15
RBI: Cognitive Flexibility (CF)	-	1.01	1.02
RBI: Achievement Orientation (ACH)	-	.94	.94
RBI: Fitness Motivation (FM)	-	.86	.86
RBI: Interpersonal Skills - Diplomacy (ISDIP)	-	1.22	1.22
RBI: Stress Tolerance (ST)	-	1.02	1.03
RBI: Hostility to Authority (HOST)	-	1.08	1.08
RBI: Self-Efficacy (SE)	-	.84	.84
RBI: Cultural Tolerance (CT)	-	1.11	1.11
RBI: Army Identification (AI)	-	<b>.60</b>	<b>.59</b>
RBI: Impulsiveness (IMP)	-	1.20	1.20
RBI: Educational Identification (EDID)	-	<b>.73</b>	<b>.74</b>
RBI: Response Distortion (RD)	-	<b>1.32</b>	<b>1.31</b>
PFC: Persistence (PERSIST)	-	1.04	1.05
PFC: Group Orientation (GRORIENT)	-	.92	.91
<i>d</i> for Model Predicted Value	.14	.98	.99

Note:  $N = 994-1015$ . Cell values for each predictor represent odds ratios. Odds ratios greater than one indicate increases in scores on the given predictor are associated with increases in the risk of disenrollment. Odds ratios less than one indicate increases in scores on the given predictor are associated with decreases in the risk of disenrollment.  $d = (M_{\text{Predicted Score for Disenrolled Cadets}} - M_{\text{Predicted Score for Enrolled Cadets}}) / \text{Pooled } SD$ . Predicted values are scaled in such a way that higher values reflect greater likelihood of disenrollment. Boldface text indicates odds ratios was significant ( $p < .05$ , two-tailed).

Given the “optimal” nature of regression-weighted composites noted earlier, the criterion-related validity estimates presented for the composite of RBI and PFC scales in Model 2 in Table 5.2 ( $d = .98$ ) may be optimistic. Table 5.3 attempts to deal with this issue by presenting results for unit-weighted composites of a reduced set of RBI-PFC scales. Not surprisingly, results in Table 5.3 reveal that a reduced unit-weighted composite of RBI and PFC scales appeared to have lower levels of criterion related validity (Model 4  $d = .64$ ) relative to the regression-weighted composite of all RBI-PFC scales (Model 2  $d = .98$ ). Nevertheless, this unit-weighted composite still produced good levels of prediction. For example, based on results for Model 4 in Table 5.3, for every one standard deviation increase in unit-weighted RBI-PFC composite scores, the odds were 1.71 times *lower* that a Cadet would disenroll.

**Table 5.3. Logistic Regression Results for Unit-Weighted RBI+PFC Composite with Disenrollment as the Criterion**

Predictor	Odds Ratios		
	Model 1 (WPS Only)	Model 4 (Unit-Weight RBI+PFC)	Model 5 (WPS + Unit-Weight RBI+PFC)
Whole Person Score (WPS)	.88	-	.93
Unit-Weighted RBI+PFC Composite	-	<b>.58</b>	<b>.59</b>
<i>d</i> for Model Predicted Value	.14	.64	.65

Note:  $N = 994-999$ . Cell values for each predictor represent odds ratios. Odds ratios less than one indicate increases in scores on the given predictor are associated with decreases in the risk of disenrollment.  $d = (M_{\text{Predicted Score for Disenrolled Cadets}} - M_{\text{Predicted Score for Enrolled Cadets}}) / \text{Pooled } SD$ . Predicted values are scaled in such a way that higher values reflect greater likelihood of disenrollment. The Unit-Weighted RBI+PFC composite was constructed by averaging standard scores for scales appearing on a reduced version of the CBEF that reflected changes to the CBEF made as a result of the current effort (see Chapter 6). The CBEF scales included in this composite were: the RBI SE, ST, ACH, AI, FM, EDID, and HOST scales and the PFC GRORIENT scale. Boldface text indicates odds ratios was significant ( $p < .05$ , two-tailed).

### **Regression Results for Predicting Cadets' Likelihood of Becoming an Army Officer**

Regression results using Cadets' self-rated likelihood of becoming an Army Officer as the focal criterion are presented in Table 5.4. Recall from Chapter 4 that the self-rated likelihood of becoming an Army Officer criterion reported here reflects a dichotomized variable (1=More Likely, 0 = Less Likely). Results are fairly consistent with those for the disenrollment criterion. For example, once again RBI Army Identification and Educational Identification appear to have been the strongest predictors. For example, for every one standard deviation increase in RBI Army Identification scores, the odds were 2.86 *greater* that a Cadet viewed him/herself as more likely to become an Army Officer (holding all other predictors, including the WPS, constant). For every one standard deviation increase in RBI Educational Identification scores, the odds were 1.49 times *greater* that a Cadet viewed him/herself as more likely to become an Army Officer (again, holding all other predictors constant). One difference between the results presented here relative to the results presented for disenrollment was that the RBI Response Distortion scale was not a significant predictor of Cadets' self-rated likelihood of becoming an Army Officer.

As with the disenrollment criterion, there was a notable increase in criterion-related validity when the RBI and PFC scales were added to a model containing the WPS only (e.g., Model 1  $d = .04$  vs. Model 3  $d = 1.99$ ). A comparison of chi-squared fit statistics for these models revealed that this increment in validity was statistically significant ( $\Delta\chi^2 [15] = 114.18, p < .01$ , one-tailed). Further examination revealed that this improvement in validity was attributable to the RBI scales, as a comparison of a model that included the WPS and RBI scales only to Model 3 revealed that addition of the PFC scales failed to significantly increment the validity of the reduced model ( $\Delta\chi^2 [2] = 0.65, ns$ , one-tailed).

**Table 5.4. Logistic Regression Results with Cadets' Self-Rated Likelihood of Becoming an Army Officer as the Criterion**

Predictor	Odds Ratios		
	Model 1 (WPS Only)	Model 2 (RBI+PFC)	Model 3 (WPS+RBI+PFC)
Whole Person Score (WPS)	0.95	-	0.89
RBI: Peer Leadership (PLEAD)	-	0.90	0.91
RBI: Cognitive Flexibility (CF)	-	1.03	1.04
RBI: Achievement Orientation (ACH)	-	1.37	1.37
RBI: Fitness Motivation (FM)	-	0.92	0.93
RBI: Interpersonal Skills - Diplomacy (ISDIP)	-	1.01	1.01
RBI: Stress Tolerance (ST)	-	1.32	1.35
RBI: Hostility to Authority (HOST)	-	1.09	1.09
RBI: Self-Efficacy (SE)	-	1.08	1.08
RBI: Cultural Tolerance (CT)	-	0.83	0.83
RBI: Army Identification (AI)	-	<b>2.94</b>	<b>2.86</b>
RBI: Impulsiveness (IMP)	-	0.72	0.72
RBI: Educational Identification (EDID)	-	<b>1.47</b>	<b>1.49</b>
RBI: Response Distortion (RD)	-	0.81	0.80
PFC: Persistence (PERSIST)	-	0.95	0.96
PFC: Group Orientation (GRORIENT)	-	1.16	1.16
<i>d</i> for Model Predicted Value	.04	2.00	1.99

Note.  $N = 1015-1020$ . Cell values for each predictor represent odds ratios. Odds ratios greater than one indicate increases in scores on the given predictor are associated with increases in Cadets' self-rated likelihood of becoming an Army Officer. Odds ratios less than one indicate increases in scores on the given predictor are associated with decreases Cadets' self-rated likelihood of becoming an Army Officer.  $d = (M_{\text{Predicted Score for "More Likely" Cadets}} - M_{\text{Predicted Score for "Less Likely" Cadets}}) / \text{Pooled } SD$ . Predicted values are scaled in such a way that higher values reflect greater likelihood of becoming an Army Officer. Boldface text indicates odds ratios was significant ( $p < .05$ , two-tailed).

As was the case with the disenrollment criterion, given the optimization of regression weights for RBI and PFC scales for the current sample of Cadets, the criterion-related validity estimates presented for the composite of RBI and PFC scales in Model 2 in Table 5.4 ( $d = 2.00$ ) may be optimistic. Results presented in Table 5.5 attempt to deal with this issue by presenting results for unit-weighted composites of a reduced set of RBI-PFC scales. Not surprisingly, results in Table 5.5 reveal that a reduced unit-weighted composite of RBI and PFC scales appeared to have lower levels of criterion related validity (Model 4  $d = 1.39$ ) relative to the regression-weighted composite of all RBI-PFC scales (Model 2  $d = 2.00$ ). Nevertheless, this unit-weighted composite still produced good levels of prediction. For example, based on results for Model 4 in Table 5.4, for every one standard deviation increase in unit-weighted RBI-PFC composite scores, the odds were 3.08 times *greater* that a Cadet viewed him/herself as more likely to become an Army Officer.

**Table 5.5. Logistic Regression Results for Unit-Weighted RBI+PFC Composite with Cadets’ Self-Rated Likelihood of Becoming an Army Officer as the Criterion**

Predictor	Odds Ratios		
	Model 1 (WPS Only)	Model 4 (CBEF Unit Composite)	Model 5 (WPS+CBEF Unit Composite)
Whole Person Score (WPS)	0.95	-	0.81
Unit-Weighted RBI+PFC Composite	-	<b>3.08</b>	<b>3.17</b>
<i>d</i> for Model Predicted Value	0.04	1.39	1.40

Note.  $N = 1015-1020$ . Cell values for each predictor represent odds ratios. Odds ratios greater than one indicate increases in scores on the given predictor are associated with increases in Cadets’ self-rated likelihood of becoming an Army Officer. Odds ratios less than one indicate increases in scores on the given predictor are associated with decreases Cadets’ self-rated likelihood of becoming an Army Officer.  $d = (M_{\text{Predicted Score for “More Likely” Cadets}} - M_{\text{Predicted Score for “Less Likely” Cadets}}) / \text{Pooled } SD$ . Predicted values are scaled in such a way that higher values reflect greater likelihood of becoming an Army Officer. Boldface text indicates odds ratios was significant ( $p < .05$ , two-tailed).

**Regression Results for Predicting Cadets’ Likelihood of Making the Army a Career**

Regression results using Cadets’ self-rated likelihood of making the Army a career as the focal criterion are presented in Table 5.6. Recall from Chapter 4, that the self-rated likelihood of making the Army a career criterion reported here reflects a dichotomized variable (1= Likely, 0 = Unlikely). Results for this criterion differ in some notable ways relative to criteria presented above. For example, unlike previous regression results, WPS exhibited a statistically significant negative relationship with Cadets’ self-rated likelihood of making the Army a career. This relationship emerged in the case when WPS scores were considered in isolation (Model 1) as well as when considered in the context of RBI and PFC scores (Model 3). For example, based on Model 3, for every one standard deviation increase in WPS scores, there was a 47% decrease in the odds that a Cadet viewed him/herself as likely to make the Army a career (holding scores on all RBI and PFC scales constant). Such a finding may be indicative that Cadets who have high WPS scores perceive that they have more potential civilian job opportunities relative to Cadets who have low WPS scores—and as such may view themselves as less likely to make the Army a career.

Another difference between results for this criterion relative to results for disenrollment and self-rated likelihood of becoming an Army Officer presented earlier regard the significance of RBI scales. Although RBI Army Identification once again emerged as a statistically significant predictor, RBI Educational Identification did not. Nevertheless, RBI Self-Efficacy did emerge as a statistically significant predictor of Cadets’ self-rated likelihood of making the Army a career. Additionally, note that the magnitude of the relation between RBI Army Identification and likelihood of making the Army a career appeared to be stronger relative to its relation with the other criteria. For example, for every one standard deviation increase in RBI Army Identification scores, the odds were 3.45 times greater that a Cadet viewed him/herself as likely to make the Army a career (holding all other predictors, including the WPS, constant). The increased contribution of RBI Army Identification and decreased contribution of RBI Educational Identification when predicting self-rated likelihood of making the Army a career relative to the other criteria make intuitive sense in

**Table 5.6. Logistic Regression Results for Cadets' Self-Rated Likelihood of Making the Army Career as the Criterion**

Predictor	Odds Ratios		
	Model 1 (WPS Only)	Model 2 (RBI+PFC)	Model 3 (WPS+RBI+PFC)
Whole Person Score (WPS)	<b>0.65</b>	-	<b>0.68</b>
RBI: Peer Leadership (PLEAD)	-	0.81	0.83
RBI: Cognitive Flexibility (CF)	-	0.78	0.82
RBI: Achievement Orientation (ACH)	-	1.30	1.30
RBI: Fitness Motivation (FM)	-	0.77	0.79
RBI: Interpersonal Skills - Diplomacy (ISDIP)	-	0.88	0.88
RBI: Stress Tolerance (ST)	-	0.88	0.93
RBI: Hostility to Authority (HOST)	-	0.91	0.92
RBI: Self-Efficacy (SE)	-	<b>1.61</b>	<b>1.59</b>
RBI: Cultural Tolerance (CT)	-	1.19	1.19
RBI: Army Identification (AI)	-	<b>3.57</b>	<b>3.45</b>
RBI: Impulsiveness (IMP)	-	1.09	1.06
RBI: Educational Identification (EDID)	-	0.81	0.86
RBI: Response Distortion (RD)	-	1.28	1.22
PFC: Persistence (PERSIST)	-	0.92	0.93
PFC: Group Orientation (GRORIENT)	-	1.08	1.03
<i>d</i> for Model Predicted Value	.44	1.76	1.83

Note.  $N = 1015-1020$ . Cell values for each predictor represent odds ratios. Odds ratios greater than one indicate increases in scores on the given predictor are associated with increases in Cadets' self-rated likelihood of making the Army a career. Odds ratios less than one indicate increases in scores on the given predictor are associated with decreases in Cadets' self-rated likelihood of making the Army a career.  $d = (M_{\text{Predicted Score for "Likely" Cadets}} - M_{\text{Predicted Score for "Unlikely" Cadets}}) / \text{Pooled } SD$ . Predicted values are scaled in such a way that higher values reflect greater likelihood of making the Army a career. Boldface text indicates odds ratios was significant ( $p < .05$ , two-tailed).

that the former should be much more a function of a Cadet's identification with the Army rather than his/her desire to obtain a college degree.

As with the other criteria, there was a notable increase in criterion-related validity when the RBI and PFC scales were added to a model containing the WPS only (e.g., Model 1  $d = .44$  vs. Model 3  $d = 1.83$ ). A comparison of chi-squared model fit statistics for these models revealed that this increment in validity was statistically significant ( $\Delta\chi^2 [15] = 154.34, p < .01$ , one-tailed). Further examination revealed that this improvement in validity was attributable to the RBI scales, as comparison of a model that included the WPS and RBI scales only to Model 3 revealed that addition of the PFC scales failed to significantly increment the validity of the reduced model ( $\Delta\chi^2 [2] = 0.16, ns$ , one-tailed).

As was the case with the other criteria, given the optimization of regression weights for RBI and PFC scales for the current sample of Cadets, the criterion-related validity estimates presented for the composite of RBI and PFC scales in Model 2 in Table 5.6 ( $d = 1.76$ ) may be optimistic. Results presented in Table 5.7 attempt to deal with this issue by presenting results for unit-weighted composites of a reduced set of RBI-PFC scales. As with

**Table 5.7. Logistic Regression Results for Unit-Weighted RBI+CBEF Composite with Cadets' Self-Rated Likelihood of Making the Army Career as the Criterion**

Predictor	Odds Ratios		
	Model 1 (WPS Only)	Model 4 (Unit-Weight RBI+PFC )	Model 5 (WPS + Unit-Weight RBI+PFC )
Whole Person Score (WPS)	<b>0.65</b>	-	<b>0.56</b>
Unit-Weighted RBI+PFC Composite	-	<b>2.26</b>	<b>2.48</b>
<i>d</i> for Model Predicted Value	0.44	0.90	1.07

Note.  $N = 1015-1020$ . Cell values for each predictor represent odds ratios. Odds ratios greater than one indicate increases in scores on the given predictor are associated with increases in Cadets' self-rated likelihood of making the Army a career. Odds ratios less than one indicate increases in scores on the given predictor are associated with decreases Cadets' self-rated likelihood of making the Army a career.  $d = (M_{\text{Predicted Score for "Likely" Cadets}} - M_{\text{Predicted Score for "Unlikely" Cadets}}) / \text{Pooled } SD$ . Predicted values are scaled in such a way that higher values reflect greater likelihood of making the Army a career. Boldface text indicates odds ratios was significant ( $p < .05$ , two-tailed).

the other criteria, results in Table 5.7 reveal that a reduced unit-weighted composite of RBI and PFC scales appeared to have lower levels of criterion related validity (Model 4  $d = 0.90$ ) relative to the regression-weighted composite of all RBI-PFC scales (Model 2  $d = 1.76$ ). Nevertheless, this unit-weighted composite still produced good levels of prediction. For example, based on results for Model 4 in Table 5.7, for every one standard deviation increase in unit-weighted RBI-PFC composite scores, the odds were 2.26 times *greater* that a Cadet viewed him/herself as likely to make the Army a career.

### ***Potential Impact of Considering the CBEF in the Scholarship Awarding Process***

The above results indicate that the CBEF offers considerable promise in supplementing the WPS to reduce disenrollment of four-year scholarship recipients. To establish a better sense of the value that the CBEF may add to WPS when awarding scholarships, Table 5.8 presents disenrollment rates for Cadets who scored in different ranges of several potential predictor composites. These composites reflect *rescaled predicted values* from the five models presented earlier in the section on regression results for disenrollment. Specifically, results in Table 5.8 are based on composite scores that have been scaled in a way such that higher scores reflect a lower expected likelihood of disenrollment.

To help interpret the results in Table 5.8, it is useful to consider that the base rate of disenrollment among Cadets who completed the CBEF was 10.3%. Taking results for Model 4 as an example, Table 5.8 shows that Cadets who scored in the top 75% of a composite formed from a unit-weighted combination of RBI and PFC scale scores (again, scaled in a way such that *higher* scores reflect a *lower* expected likelihood of disenrollment) had disenrollment rates ranging from 4.45 to 9.16%, whereas Cadets who scored in the bottom 25% of that composite had disenrollment rates of 20.8%—double the disenrollment rate of Cadets in general in the current sample. Contrast this finding with the disenrollment rate of Cadets on the bottom 25% of the WPS score distribution (13.39%) and the difference in the relative risk of Cadets at the lower end of these distributions becomes apparent. Such findings, coupled with the criterion-related validity results presented earlier suggest that the



CBEF may prove effective as a measure to screen out a given percentage of applicants who would be at heightened risk for disenrollment relative to the Cadet population in general.

**Table 5.8. Disenrollment Rates by Quartile of Rescaled Model Predicted Values**

Model	Quartile	Enrolled	Disenrolled	Total	Disenrollment Rate
1 WPS Only	Bottom 25%	220	34	254	13.39
	26-50%	214	18	232	7.76
	51-75%	225	20	245	8.16
	Top 25%	225	27	252	10.71
2 Regression RBI+PFC	Bottom 25%	194	51	245	20.82
	26-50%	226	23	249	9.24
	51-75%	239	13	252	5.16
	Top 25%	232	15	247	6.07
3 Regression WPS+RBI+PFC	Bottom 25%	191	54	245	22.04
	26-50%	228	21	249	8.43
	51-75%	237	14	251	5.58
	Top 25%	235	13	248	5.24
4 Unit-Weighted RBI+PFC	Bottom 25%	198	52	250	20.80
	26-50%	236	11	247	4.45
	51-75%	228	23	251	9.16
	Top 25%	235	16	251	6.37
5 WPS + Unit-Weighted RBI+PFC	Bottom 25%	200	50	250	20.00
	26-50%	230	15	245	6.12
	51-75%	232	19	251	7.57
	Top 25%	235	18	253	7.11

*Note.* Predicted values are scaled in such a way that *higher* values reflect a *lower* expected likelihood of disenrollment. Model 1= WPS only, Model 2 = Regression-weighted RBI-PFC scale composite, Model 3 = Regression-weighted WPS-RBI-PFC scale composite, Model 4 = Unit-weighted RBI-PFC composite, Model 5 = Unit-weighted WPS-RBI-PFC composite.



## Chapter 6: Next Steps for the CBEF

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As described at the beginning of this report, the focus of the current effort was to develop a new measure that improves the prediction of ROTC continuance for four-year scholarship recipients, beyond the level of prediction already afforded by the current scholarship award process, specifically Whole Person Scores. Chapters 2-5 of this report presented data showing that the CBEF has a great deal of promise for identifying Cadets who are at heightened risk for disenrollment. ARI and HumRRO briefed Cadet Command on these results in January of 2008.

Nevertheless, the results are just a first step in a larger research process examining the potential for using the CBEF in the process of awarding four-year scholarships. In this chapter, we provide an overview of the larger program of research surrounding the CBEF, and describe plans for its future evaluation.

### *Revisions to the CBEF*

We revised the content of the CBEF based on a review of the psychometric properties of the version of the CBEF examined in the earlier chapters. ARI personnel, HumRRO staff, and an external consultant with expertise in the development and validation of selection measures met on several occasions to (a) identify CBEF scales that should be dropped or improved; (b) identify scales that should be added to the CBEF; (c) write new items as needed; and (d) ensure that all items were appropriate for high school students with no military experience.

Based on those discussions, we dropped the following CBEF scales: Cultural Tolerance, Cognitive Flexibility, Impulsiveness, Interpersonal Skills, and Peer Leadership. Additional Educational Identification biodata items were written to improve the internal consistency of this scale (recall its relatively low reliability presented in Table 4.1,  $\alpha = .49$ ). Finally, we added several new RBI scales: Attitudes Toward Deployment, Continuance Commitment, Past Withdrawal Propensity, and Traditional Values.

We also edited the PFC items to improve their readability and did some follow-up analyses on the PFC to make further refinements. As described in Chapter 2, 15 factors were extracted in an initial factor analysis of PFC items for the current sample. Three researchers met to discuss possible reasons and solutions for this heterogeneity. Researchers concluded that (a) many of the descriptors anchoring the two ends of each item were confusing or unnecessarily complex, (b) the two descriptors in several items were likely measuring very different things, and (c) too many assumptions were required when answering the items. Therefore, we revised the items. The descriptors were shortened considerably by creating a

stem for each item. Thus, only a few words, at most, were needed for the two (i.e., bottom and top) descriptors. Several items were dropped because they could not be revised to fit the new form (e.g., the two descriptors described different situations). The researchers also refined the PFC scales and sorted items into the new scales. The revised PFC comprises 18 items divided across three scales:

- Group Orientation
- Propensity for Group Commitment
- Need for Autonomy vs. Need for Affiliation

The Group Orientation and Propensity for Group Commitment scale are conceptually similar to the PFC Group Orientation and PFC Persistence scales analyzed in this report. The new Need for Autonomy vs. Need for Affiliation scale represents a subset of original items augmented by new items that attempt to isolate a specific preference for working alone versus as part of a group.

Finally, we added a “work values” section asking respondents to rank order nine work characteristics in terms of their relative importance on their “ideal job”. The characteristics chosen were carefully selected to reflect a balance of work characteristics that would generally either be (a) descriptive of the work environment of Army Officers or (b) not descriptive of the work environment of Army Officers. The rationale behind such a measure is that Cadets who place more importance on work characteristics descriptive of the work environment of Army Officers (relative to those that are not descriptive) would be more likely to experience positive outcomes (e.g., actually becoming an Army Officer, making the Army a career) compared to Cadets who place more importance on work characteristics that are not descriptive of the work environment of Army Officers. An overview of the final content of the CBEF-2 appears in Table 6.1.

### ***Development of the Cadet Experience Form (CEF)***

In anticipation of future evaluations of the CBEF, we developed a self-report criterion measure as part of the current effort—the Cadet Experience Form (CEF). The CEF asks respondents to describe their attitudes toward college, ROTC, and the Army. It is appropriate for administration to Cadets who have some experience with college, ROTC, and the Army; that is, Cadets who are in the spring of their freshmen year or later. To develop this measure, we drew on our experience in previous Army research using similar measures (Strickland, 2004) and also adapted items from the Cadet Command’s On Campus Market Potential (OCMP) survey which is periodically administered to college students on campuses that host Army ROTC. While the specific items on the OCMP survey have varied over the years, the surveys typically contain a core of similar items about students’ attitudes toward the ROTC program.

### ***Additional Data Collection Efforts***

This report studied the validity of the original CBEF by longitudinally tracking a sample of freshmen four-year ROTC scholarship recipients tested in SY06-07. Since then,

plans have been made to administer the updated CBEF (CBEF-2) to other ROTC Cadet cohorts, especially, students earlier in their affiliation with ROTC (e.g., high school students who are applying for a scholarship). Future longitudinal research will examine the validity of the CBEF for predicting: (a) actual entry into the ROTC program, (b) full program completion and commissioning into the Army, and (c) career continuance in the Army beyond the service obligation incurred with ROTC.

***Table 6.1. Overview of Content on the CBEF-2***

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<b>RBI: Achievement Orientation:</b> The willingness to give one's best effort and to work hard towards achieving difficult objectives.
<b>RBI: Army Identification</b> The degree of personal identification with, and intrinsic interest in becoming, a U.S. Army Officer.
<b>RBI: Attitudes Toward Deployment:</b> The tendency to participate in activities associated with risk of self-injury and danger.
<b>RBI: Continuance Commitment:</b> Degree of commitment to finishing college or completing ROTC because (a) the cost of leaving is too high, (b) the quality of his/her options will be better, or (c) it is a way to achieve his/her ultimate career goal.
<b>RBI: Educational Identification:</b> Seeks a college degree. Perceives self as someone who will complete college.
<b>RBI: Fitness Motivation:</b> Degree of enjoyment from participating in physical exercise. Willingness to put in the time and effort to maintain good physical conditioning.
<b>RBI: Hostility to Authority:</b> Being suspicious of the motives and actions of legitimate authority figures. Viewing rules, regulations, and directives from higher authority as punitive and illegitimate.
<b>RBI: Response Distortion:</b> The purpose is to detect and adjust for socially desirable responding.
<b>RBI: Past Withdrawal Propensity:</b> The tendency to withdraw from commitments (e.g., high school, jobs).
<b>RBI: Self-Efficacy:</b> Feeling that one has successfully overcome work obstacles in the past and that one will continue to do so in the future.
<b>RBI: Stress Tolerance:</b> Ability to maintain one's composure under pressure. Remaining calm and in control of one's emotions instead of feeling anxious and worried.
<b>RBI: Traditional Values:</b> Acceptance of societal values, authority, and the value of discipline.
<b>PFC: Group Orientation:</b> The tendency to seek out and affiliate with a group.
<b>PFC: Propensity for Group Commitment:</b> The tendency to persist with one's group membership, even when problems arise.
<b>PFC: Need for Autonomy vs. Need for Affiliation:</b> The tendency to prefer working alone versus in a group.
<b>Work Values Profile Consistent/Inconsistent with the Work of an Army Officer</b>

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***Summary***

As described at the beginning of this report, the focus of the current effort was to develop a new measure that improves the prediction of ROTC continuance for four-year scholarship recipients. Chapters 2-5 of this report described how three criterion variables were used to evaluate the potential of the CBEF's RBI and PFC scales for predicting (a) disenrollment (versus enrollment), (b) Cadets' self-reported likelihood of becoming an Army Officer, and (c) Cadets' self-reported likelihood of making the Army a career. When

considered in isolation, several CBEF scales were significantly predictive of all three criteria, notably RBI Army Identification, Achievement Orientation, Fitness Motivation, Self-Efficacy, Hostility to Authority, and PFC Persistence (Table 5.1). When considered in the context of all CBEF scales and the WPS via logistic regression analyses: (a) only the RBI Army Identification scale remained significantly related to all three criteria, (b) the RBI Educational Identification scale was significantly related to disenrollment and Cadets' self-rated likelihood of becoming an Army Officer, and (c) the RBI Self-Efficacy scale was significantly related to Cadets' self-rated likelihood of making the Army a career (Tables 5.2 through 5.7). Furthermore, these logistic regression analyses indicated that addition of CBEF scale scores (in particular, RBI scale scores) to a model including only WPS significantly incremented the validity of WPS for predicting all three criteria (Tables 5.2 through 5.7).

### ***Implications of Findings***

The results summarized in this report suggest there is good potential for developing selection measures designed to predict disenrollment among four-year high school scholarship applicants. These findings encourage further research on a selection measure for use in an operational setting (i.e., as part of the actual process for awarding four-year high school scholarships). For example, the present study involved administering the CBEF to Cadets in the spring of their freshman year in college. These data enabled examination of relationships between CBEF scores and disenrollment that occurred between the spring of Cadets' freshman year and fall of their sophomore year, to include estimations for a refined version of the CBEF likely used in subsequent efforts. However, the data did not allow for examination of disenrollment that occurs (a) prior to the spring of Cadets' freshman year or (b) beyond the fall of Cadets' sophomore year. Gathering CBEF data from applicants would allow one to examine early disenrollment and clarify the susceptibility of measures like the CBEF to factors present in an operational setting (e.g., strong motivation to perform well on the assessment). As alluded to above, future research is also needed to determine whether the CBEF predicts outcomes that occur beyond Cadet's sophomore year in college, to include graduation from ROTC, performance in ROTC, and performance as an Army Officer. In sum, this study provides a promising foundation for future work geared towards developing and implementing operationally useful measures for selecting individual who would be successful as ROTC Cadets and later as a commissioned Army Officer.

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## Appendix: Data Collection Preparation and Session Instructions

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1. Review and annotate the roster of freshman four-year scholarship recipients. For each person listed, indicate his/her ROTC affiliation status by checking one of the following:
    - **In Program:** The individual is a MS 1 Cadet about to complete the freshman year.
    - **Dropped Out:** The individual **enrolled in MS 1 but has since dropped out** of the program (for any reason).
    - **Never Started:** While awarded a scholarship, the individual **did not enroll** in MS 1.
    - **Other:** Describe in the section provided for notes.
  2. Update the roster for any Cadet who is not listed and who is a freshman four-year scholarship recipient.
  3. Become familiar with the purpose of the study and the instructions for a questionnaire administration session.
  4. Arrange to collect data from all Cadets on the updated roster at the same time during one classroom session. This session is expected to last no longer than one 50-minute class.
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*Figure A.1. Data collection preparation instructions.*

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1. Distribute the envelopes to the Cadets.
  2. Inform the Cadets of the study's purpose. Do this by reading or paraphrasing the study's purpose from the Cadet Command's letter of instructions to the PMS.
  3. Have the Cadets open their envelopes and check the contents -- Each envelope should contain a privacy act statement and a questionnaire booklet.
  4. Have the Cadet read the privacy act statement. As they do so, point out that --
    - **Participation is voluntary.** While making this point, *also mention that Cadet participation is needed for evaluating the utility of the questionnaires.*
    - **The study asks for identifiers (SSNs)** for linking questionnaire responses to Cadet Command data, in particular, data on success and retention in ROTC.
    - **Provisions are being taken to protect confidentiality** to include:
      - Completed materials placed back in their original envelope.
      - Immediate shipment of completed envelopes to the study team via Federal Express.
      - Access to the data only by members of the study team.
      - No report of findings that links specific responses to specific individuals.
  5. Answer any question that a Cadet may have.
  6. Ask participating Cadets to complete the privacy act statement -- Signing or printing their name, SSN, and current date.
  7. Instruct the Cadets that the questionnaire has **three parts** and that they need to **read the directions for a part before starting it.**
  8. Then tell the Cadets to begin Part I, to complete the whole questionnaire at their own pace, and to mark their responses on the questionnaire book (pen or pencil).
  9. Have Cadets place complete privacy act statements and questionnaires into the original envelopes and seal the envelopes. *Visibly place completed Cadet envelopes into the return Federal Express envelope.*
  10. Ship Cadet envelopes and the roster to ARI using the Federal Express materials provided.

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***Figure A.2. Instructions for data collection sessions.***