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The Efficacy of Personality and Interest Measures as a Supplement to Cognitive Measures in the Prediction of Military Training Performance

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A Thesis submitted in Partial Fulfillment of the

Requirement for the Degree of Master of Science in

Applied Psychology (Industrial/Organizational)

Saint Mary's University

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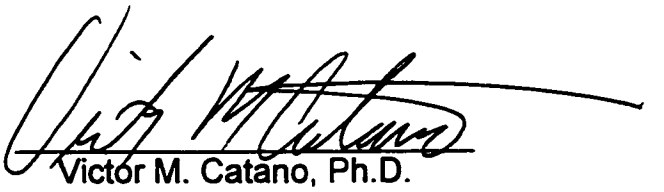
Approved: 
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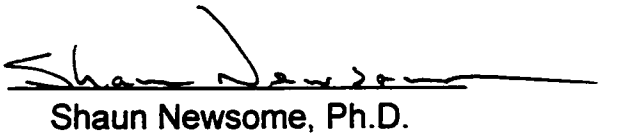
Approved: 
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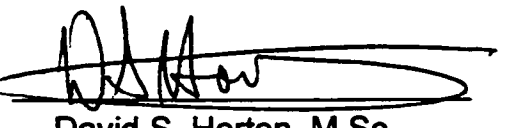
Approved: 
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Date: February 1999

Table of Contents

APPENDICES

ACKNOWLEDGEMENT

I would like to gratefully acknowledge a number of individuals for their assistance to me in completing this thesis. Firstly, I would like to thank my primary advisor, Dr. Victor Catano, for his high quality ideas and feedback. Secondly, I would like to thank my thesis committee members, Dr. Shaun Newsome and Mr. David Horton, for their time, comments and suggestions. Thirdly, I would like to thank my external reader, Dr. Hermann Schwind, for his contributions and for his enthusiasm in accepting this position. These efforts were all sincerely appreciated.

I am also happy to acknowledge my friends and colleagues at Saint Mary's University. Their moral support was crucial for completing a project of this magnitude. Concurrently, there are a number of individuals in the Canadian Forces to whom I am grateful. In particular, I would like to thank Damian O'Keefe for his consistent advise and assistance and Dave Woycheshin for his time and effort in administrating the test measures.

Finally, I would like to thank my family (in Sackville, Oakville and Halifax) for their support, love and understanding over the past year and a half. I would never have been able to complete this thesis without them.

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The purpose of this study was to examine the predictive validity of cognitive ability, personality, and vocational interest measures on two performance criteria within the Canadian Forces (CF): 1) Training Success/Failure, 2) Training Performance. It specifically looked at the incremental validity of a personality measure and an interest inventory (non-cognitive ability measures) over and above a cognitive ability measure in the prediction of both training course success, and level of training course performance of Non-Commissioned-Member (NCM) recruits.

NCM recruits (n=138) completed the Canadian Forces Aptitude Test (CFAT), the Measure of Personal Attributes (MPA) and the Canadian Work Preference Inventory (CWPI) at the beginning of the 8-week Basic Recruit Training Course (BRTC) and were included in the Training Performance criterion group. The Training Performance criterion consisted of supervisory ratings of each applicant's performance in areas such as Physical Training, Military Knowledge, and Basic Drill Inspections. The Training Success criterion (n=264) was simply the applicant's success or failure in completing the training course.

Significant correlations existed between the CFAT (Total, Problem Solving, Verbal Skills, and Spatial Ability) and Training Performance. The CFAT Total score , Spatial Ability and Problem Solving also correlated to Training Success. No relationship existed between the MPA and Training

Performance. However, the MPA Total score, Dominance, Adjustment, Achievement and Internal Control correlated to Training Success/Failure. The CWPI Total score and the Directive and Innovative subscales correlated to Training Performance while only the Directive subscale correlated to Training Success/Failure.

Controlling for gender and language, the CFAT Total score and all of its subscales predicted Training Performance. The CWPI Total score and two of its subscales (Directiveness & Innovativeness) also predicted Training Performance. None of the MPA subscales were successful in predicting Training Performance. Again controlling for gender and language, the CFAT Total score and Problem Solving subscale as well as the MPA Total score and Dominance subscale were predictive of Training Success/Failure.

The results of this study indicate that the cognitively oriented CFAT is a valid predictor of NCM performance in BRTC. The results also indicate that certain non-cognitive factors are important both in predicting Training Performance and Training Success/Failure. As the MPA's Dominance subscale and the CWPI's Directiveness and Innovativeness subscales were predictive of performance criteria, further research should be done to investigate if a general non-cognitive ability factor such as Leadership is a better predictor of BRTC performance.

INTRODUCTION

When designing a valid selection system, both cognitive and non-cognitive aspects of individual work behaviour should be considered. This requires the use of measures that will adequately assess all relevant factors to maximize predictive validity in personnel selection. Cognitive measures have typically been the most consistent and accepted indicator of future performance. In reality however, the correlations between cognitive ability and occupational and/or academic success tend to be around .50 (Ceci, 1996; Hunter & Hunter, 1984; Neisser, et al., 1996). This value suggests that other factors may account for 75% of the variance in the remaining performance. Personality traits and individual interests may be two of these other potential predictors of performance. In the 1980s, the US Army Research Institute sought to evaluate and to amend the US Army's selection and classification system by examining the predictive validity of cognitive ability tests, personality measures and interest inventories. This initiative was labelled "Project A". Personality measures were used to assess the "will do" component of job performance while cognitive tests were used to assess the "can do" component; there was little overlap between both types of measures. Additionally, personality and interest measures supplemented the cognitive measures when used for selection purposes (White, Nord, Mael & Young, 1993).

The Canadian Forces is currently engaged in a long-term research process similar to Project A. The first phase of this research involved the

placement of 66 entry-level NCM military occupations into a smaller number of five job families (Catano and Ibel;1995). The second and current phase of this research process is to create valid screening and selection measures for the five families of entry-level military occupations. The development of the Canadian Forces Aptitude Test (CFAT), as the measure of cognitive ability and aptitude, took place as part of this CF project.

The purpose of the present study is to investigate whether measures of personality and vocational interest increase the prediction of success in military training performance over and above that provided by traditional measures of cognitive ability. Specifically, this study examines the incremental validity of a personality measure that has been adopted for use in military environments, the Measure of Personal Attributes (MPA), and an interest inventory, the Canadian Work Preference Inventory (CWPI), in predicting both course training success and training performance beyond that provided by the CFAT.

Cognitive Ability Measures

Cognitive abilities have generally been the best predictors of future individual performance in applied and academic contexts. Dunnette (1966) claimed that tests of cognitive abilities were the sole measures of individual differences and were therefore the determining factors in personnel selection and placement. This notion is still supported by the Society for Industrial and Organizational Psychology (SIOP) in its recognition of validity generalization of

cognitive ability tests (SIOP, 1987). Measures of cognitive ability have repeatedly been the best predictors of subsequent job performance compared to other predictors. In a meta-analysis of 515 validation studies, cognitive ability tests validly predicted virtually all jobs with an average validity coefficient of .47 across jobs (Hunter and Hunter, 1984). Cognitive tests are useful for evaluating an individual's ability to learn technical knowledge and skills associated with the job, while other non-cognitive measures are more useful in assessing stable, personality related performance factors (Dunnette, 1966).

Using Cognitive Abilities to Predict Performance

Ghiselli (1973) examined the mean validity of Cognitive ability across a group of eight job families. The job families in this study covered a broad range of occupations including Managers, Clerks, Salespersons, Protective professions workers, Service workers, Trades and crafts workers, Industrial workers, Vehicles operators and Sales clerks. General cognitive ability alone produced an average validity coefficient of .54 across jobs for a training success criterion and .45 for a job proficiency criterion. The average validity across job families increased with the addition of psychomotor ability tests. The average coefficient obtained in this study, .50, is congruent with the results of Hunter and Hunter's meta-analysis (1984) and is used as a standard of comparison for alternate predictors.

In a military environment, general cognitive ability was the best

predictor of job performance on seven different criteria for US Air Force enlistees. Specific abilities or knowledge only added slightly to the predictive efficiency of the model (Ree et al., 1994). The Armed Services Vocational Aptitude Battery (ASVAB), which is highly correlated with related cognitive tests, was the best overall predictor of US Army applicant performance. In particular, it was a highly effective predictor of the "can do" or technical performance components (Campbell 1990). Similarly, with a sample of police officers, Cortina, Doherty, Schmitt, Kaufman & Smith (1992) found that the administration of two personality tests failed to provide any additional variance in job performance over and above a cognitive ability Civil Service exam.

The Development of the CFAT

In the Canadian Military, the Canadian Forces Classification Battery (CFCB) in conjunction with the General Classification (GC3) measure were the principal measures used for the selection and assignment of CF Non-Commissioned Member (NCM) applicants. These tests were measures of cognitive ability and assessed the applicant's level of knowledge and technical skills and abilities. In October 1997, the CFAT replaced both the CFCB and the GC3 measures. The CFAT is the current standardized measure given to all Non-Commissioned-Members (NCMs) applying for admission into the CF. It was derived from items that were included in either the CFCB or the GC3; the goal was to produce a single measure that could be used for both screening and classification purposes. As such, the CFAT is similar in nature

to the GC3 measure in that it primarily assesses cognitive ability.

Spinner (1991) proposed the original four-factor version of the CFAT by factoring items of the GC3 and CFCB tests. The four scales of ability were Problem-Solving, Knowledge, Pattern and Technical. Spinner also proposed an overall composite ability score called the CFAT Full scale which consisted of Problem-Solving, Knowledge and Pattern subscales. The Technical scale, which assessed areas such as Automotive & Electronic Information, was unreliable for females and was not included in the CFAT Full scale measure. The present version of the CFAT has been reduced to a three-factor solution which assesses Problem-Solving, Spatial Ability and Verbal Skills. The Problem Solving subscale was derived from the original Problem Solving scale and from the nonverbal ability items within the original Knowledge subscale. The Spatial Abilities subscale replaced the original Pattern subscale and the Verbal Skills subscale consisted of the Verbal abilities items assessed within the original Knowledge subscale. The Technical subscale of the original CFAT was eventually dropped due to its low reliability for female respondents (MacLennan, 1997).

The predictive validity of CF ability tests has been established in a number of studies. Ibel & Cotton (1994) showed that Experimental CFAT scales performed as well as, and better in two cases, than the CFCB in predicting NCM occupational performance. In this study, nine military occupation classifications (MOCs), which included cooks, medical assistants and administrative clerks, were assessed. The criteria consisted of

Qualification Level 3 (QL3) pass/fail results. The predictive effectiveness of the experimental CFAT scales indicated their potential for use in future NCM applicant selection and classification. Similarly, MacLennan (1997) found that the CFAT full scale, as developed from Spinner's (1991) initial research, was a consistently valid predictor of NCM performance. The Arithmetic Knowledge scale on the CFCB and the CFAT Problem-Solving scale also predicted pass/fail results in training. MacLennan's study was based on over 25,000 NCMs. The training performance included pass/fail results, course grade, class standing, division into thirds (top, middle and bottom) and number of attempts at training before successful completion. MacLennan concluded that the CFAT was a potentially valid selection tool for the CF due to its adequate psychometric properties and validity coefficients that were superior to other CF ability tests.

Measures of Personality and Interest

Personality and Interest measures are similar to one another in that they attempt to discern stable underlying traits or dispositions within individuals. They essentially assess the "will do" components of job performance. From a practice viewpoint, many organizations regard individual traits or personality characteristics as more important than cognitive abilities or traditional knowledge and skill sets in predicting future performance. These organizations use "trait" or "competency" based assessment in areas such as employee selection, performance appraisal, rewards, and compensation

(Boyatzis, 1982; Dubois, 1993; Mitrani, Dalziel & Fit, 1992; Spencer & Spencer, 1993). Similarly, within the CF, practical applications exist for the relationship between personality and interest dimensions and the five ability based occupational families into which CF NCM entry level MOCs are grouped (Catano & Ibel,1995)[1]. When examining the five CF job families, it is possible to conceptualize the relationship with non-cognitive ability factors. A clear example would be the Military job family which is related to a number of personality and interest measures. The Military job family consists of occupations such as Crewmen, Military Police, Artillerymen, and Fire Fighters. Individuals in this job family must be achievement oriented, confident and display qualities of leadership, be flexible and able to adust to change, show initiative and act as a team member. O'Keefe (1998) found that Dependability and Dominance, personality factors assessed in the Measure of Personal Attributes, predicted the job performance in the Military job family. The Dominance factor also effectively discriminated among the five CF occupational families (O'Keefe, 1998). Additionally, Woycheshin (1997) found the Canadian Work Preference Inventory (CWPI), a measure of vocational preference, to be an accurate predictor of interests types of individuals in the ability based occupational families. Cognitive or aptitude testing may indicate suitability for one of the five occupational families while personality and

---

1.The five CF job families are: Military, classified by strength, controlled reaction and vision; Operator, classified by audition, information processing and vision; Administrative; Technical A, classified by fine motor control and cognitive ability; Technical B, classified by strength, controlled reaction and cognitive ability.

interest assessment may help to focus on specific occupations within that family (Woycheshin, 1997).

Personality Theory and Selection

The "Big Five" model of personality, which has gained popularity in personnel research, proposes that personality can be described by five major constructs or factors: Extroversion, Emotional Stability, Agreeableness, Conscientiousness, and Openness to Experience (Costa & McRae, 1988). These factors are described in Table 1. These well-known factors tend to serve as a benchmark within personality theory and as a basis of comparison for measures attempting to assess aspects of personality.

Table 1
Descriptions of the Big Five Personality Factors

Big Five Factor	Descriptors
Extraversion	Talkative, gregarious, outgoing, sociable
Emotional Stability	Low in anxiety, anger, embarrassment, depression and insecurity
Agreeableness	Courteous, cooperative, considerate, and understanding
Conscientiousness	dependability, industriousness, attention to detail, responsibility
Openness to Experience	Imaginative, creative, cultured, curious, broad minded and original

McCrae and Costa (1987) developed the current model of the Big Five Factor of personality. It began as a three factor model but was later expanded to the present five factor version. This five factor model, which was

operationalized in the NEO Personality Inventory (NEO-PI), has received support from a number of studies. Barrick & Mount (1991) and Salgado (1997) concluded that the five-factor model was appropriate because of consistent results in two meta-analytic studies. In these studies, Conscientiousness and Emotional Stability validly predicted job performance. Similarly, Tett, Jackson, and Rothstein (1991) formed a similar conclusion with the exception that Agreeableness and Openness to Experience had higher mean validities. Schmit & Ryan (1993) found partial support for the five factor model using both a sample of students and a sample of job applicants. The Big Five structure was a good fit for certain populations but not for others. Although it was suggested that an additional work related factor be added for the sample of applicants, the original 5 factor structure was decidedly the most suitable model for the sample (Schmit & Ryan, 1993).

Measures of Personality and Job Performance

On their own, personality measures have displayed relatively low degrees of validity as predictors of job performance. However, many studies have produced significant results between certain personality factors and job performance. A consistent finding is that Conscientiousness is linked to higher levels of performance across occupations (Barrick & Mount, 1991; Dunn, Mount, Barrick & Ones, 1995; Salgado,1997). The other four personality dimensions tend to vary by occupational group and criterion type. For example, Extraversion validly predicted occupations involving social

interaction such as managerial and sales occupations, while Openness to experience and extraversion predicted training readiness and success (Barrick & Mount, 1991). Moreover, conscientiousness and extraversion were significant predictors of job performance for managers in highly autonomous positions (Barrick & Mount, 1993). Locus of control, similar to the emotional stability construct, correlated with factors such as job motivation, effort, performance, satisfaction, perception of the job, compliance with authority and supervisory style (Furnham & Zacherl, 1986). The personality factors of Dominance, Dependability and Achievement significantly predicted performance in the Military and Technical B job families within the CF (O'Keefe, 1998). The Military job family consists primarily of combat arms occupations and the Technical B family involves occupations of a highly technical and physically active nature. Results such as these have led both U.S. and Canadian military forces to explore the usefulness of personality predictors.

Personality Measures and Military Performance

The Assessment of Background and Life Experiences (ABLE) is a personality measure that is widely used in the U.S. Army for selection and classification purposes. To supplement the five factor model of personality, the ABLE assesses six temperament constructs: Surgency, Achievement, Adjustment, Agreeableness, Dependability and Locus of Control (Hough, 1992). It consists of ten scales or factors which measure the six temperament

constructs. The ABLE is a valid measure of some aspects of performance in the military: all of its constructs significantly predicted motivational aspects of performance of U.S. Army recruits (White & Moss, 1995); its temperament constructs significantly correlated with performance criteria such as effort and leadership, personal discipline, and physical fitness and military bearing (Hugh, Dunnette, Eaton, Kamp & McCloy, 1990); and its scales produced small but significant relationships with general (military occupation) technical skills (White, Nord, Mael & Young, 1993). The construct validities were in the .20s with adequate test-retest reliability, r=.78 (Hugh et al., 1990).

The Canadian equivalent to the ABLE is the Measure of Personal Attributes (MPA) which is currently used by the CF for similar purposes. The MPA consists of 139 items and was modelled after the ABLE-133 which is a condensed version of the original 199 item test. This version of the MPA assesses the constructs of Work Orientation, Dominance, Dependability, Adjustment, Cooperativeness, Internal Control, and Physical Condition. It also consists of a Social Desirability and a Nonrandom Response validity scale. The MPA does not possess any normative or empirical validation data as it uses U.S. Army data from the ABLE to create an optimal profile. The ABLE/MPA was not developed directly from the Big Five Model of personality. Day, Methot & Stinson (1997) attempted to link the ABLE/MPA to popular theory involving the Big Five. They demonstrated an incongruence in that only three of the seven subscales of the ABLE/MPA clearly mapped onto the Big Five constructs. Achievement, Adjustment and Dependability conceptually

mapped onto the constructs of Conscientiousness, Emotional Stability and Agreeableness respectively. Some Dominance items mapped onto Extraversion and several Dependability items corresponded significantly to Conscientiousness but the majority of the items from these two scales, did not map onto the Big Five constructs.

Studies sponsored by the Canadian Forces have assessed the relationship between personality, as measured by the MPA and the ABLE, and training performance. The predictive validity of these personality measures was not high. Bradley (1997) obtained a few significant correlations between ABLE self-reports and Basic Officer Training Camp (BOTC) performance. Locus of control and Internal control had significant but low correlations with performance. The ABLE as a whole, however, did not predict performance. This suggested that successful BOTC candidates did not differ from their unsuccessful counterparts on the array of personality factors measured by the ABLE. Using the MPA version of the ABLE to predict both military job performance and academic performance, O'Keefe (1998) obtained similar results to those in the Bradley study. Specifically, three of the seven MPA scales, Achievement, Dominance, and Internal Control, were significantly related to higher levels of military job performance regardless of rank or occupation. However, the personality measure accounted for only a small proportion of the variance in military job performance ($R^2 = .08$) and an even lower proportion of variance in academic performance. A limitation with Bradley's (1997) study was the sample size of criteria measures. Although

predictor measures were obtained from 745 participants, criterion measures were collected from only 174 of this sample. Possible confounds in the O'Keefe (1998) study were that the performance criterion was based on the CF member's self-reported Personnel Evaluation Reports (PER) rather than on actual performance data. These self-reports of personal performance may have resulted in distorted or elevated performance ratings.

Interest Theory and Selection

Interest inventories, like measures of personality, are an attempt to assess stable underlying dispositions. To date, they have been used more for classification than for selection purposes and little is known about their predictive utility in selection. There is a possibility, however, that vocational interests may be useful as predictive indices because they have a consistent relationship with job satisfaction, job persistence, and job performance (Spokane, 1985). Generally, interests are construed as all pervasive constructs that are widely applicable to many different occupations. Naylor (1993) stated that "interests are not logically or empirically limited to work.... Work might be argued to be a special case, or a limited manifestation, of much broader characteristics" (p3). In a review of literature, Naylor demonstrated that preferences for school subjects contained a thematic continuity and that vocational preferences and choices were stable over time. Prediger and Brandt (1992) supported this contention by showing that interest score profiles were congruent with students' vocational program content.

J. L. Holland is one of the most notable theorists who has examined and contributed to the development of vocational interest theory. Holland's theory is the basis of many interest measures including the Canadian Work Preference Inventory (CWPI; CWPI Technical Manual, 1992). Holland's theory is based on four assumptions: 1) Individuals are classified according to six personality types: Realistic, Investigative, Artistic, Social, Enterprising, Conventional (RIASEC), 2) A person's environment can be classified according to the same RIASEC typology, 3) People search for congruence between environment and personality, 4) Individual behaviours are determined by the interaction of personality and environment. The six personality types are presented in Table 2.

Table 2
Holland's RIASEC Typology (Naylor, 1993):

Realistic	This person is a "Doer" and is competent with Manual and Technical occupations
Investigative	This person is a "Thinker" and is Scientific and Mathematical in nature
Artistic	These people are "Creators" and possess a competence in art
Social	This type of person is a "Helper" and possesses effective interpersonal skills.
Enterprising	This person is a "Persuader" and tends to have great leadership and sales abilities
Conventional	This individual is an "Organizer" and tends to be involved in administrative types of occupations

Interest inventories have been typically used by organizations to

determine job placement, however, there is little evidence of their value in personnel selection (Smither, 1988). Recently, the CF has displayed an interest in the CWPI as an assessment of vocational interest for use in recruit selection. The CWPI is a bilingual, standardized measure that is quick and inexpensive to administer and to evaluate. It can be administered to a large sample group because its items are straight-forward and it requires a low level of reading comprehension to complete (CWPI Technical Manual, 1992). It has been normed using a mixed anglophone and francophone Canadian population making it highly applicable to the CF.

Although the CWPI does not use the exact Holland typology, it is similar enough to be used to test hypotheses based on the theory. Its five scales consist of: 1) Methodical items which assess a preference for work that is clearly defined and under the supervision of others; 2) Objective items which assess a preference for a "hands on" type of work using tools, machinery and equipment; 3) Innovative items which assess a scientific or academic orientation with a focus on problem solving; 4) Directive items which assess a preference for taking charge, organizing and directing the work of others; and 5) Social items which assess a preference for working with and helping people (CWPI Technical Manual, 1992).

Interest Inventories Used in Military Selection

For selection purposes, interest inventories are not usually an instrument of choice for recruiters. Woycheshin (1997) evaluated the CWPI

for use in the CF screening and classification process and recommended that it be used as a supplement to current NCM recruit assessment procedures. Using both student and military samples, Woycheshin found that vocational interests, as measured by the CWPI, accurately assessed individual interests, but did not significantly predict overall performance when used alone. Certain scales of the CWPI significantly correlated with performance criteria; i.e., positive relationships occurred between the Innovative and Directive factor scores and work performance in the military sample. Concurrently, negative correlations existed between the Methodical and Objective factors and performance as measured by Personal Evaluation Reports (PERs) in the military sample. The use of the CWPI did provide support for Holland's typology in the prediction of interest types but did not support the prediction of military or academic performance. The negative findings in the Woycheshin study may have stemmed from methodological weakness in the study, most notably, the self-report measures of performance.

Cognitive Versus Non-cognitive Ability Interaction in Selection

Although cognitive ability is a useful predictor of future performance, many studies have looked at the interaction or added value of personality (non-cognitive ability) measures in this predictive equation. Sackett, Gruts & Ellingson (1998) studied the interaction between ability and personality in predicting job performance in three different occupations. Based on Vroom's theoretical studies, (1960, 1964), they predicted a significant interaction

between individual ability and a personality construct, motivation; i.e., increased motivation would result in smaller increases in performance when ability was low rather than high. Although they failed to support this hypothesis, Sackett et al. remained optimistic about the relationship and stated the need for further exploratory research on the predictive role of non-cognitive factors.

Other research also suggests that the prediction of job performance could be improved with the addition of non-cognitive predictive measures. As part of Project A's validity results, McHenry, Hough, Toquam, Hanson and Ashworth (1990), showed that temperament/personality composites were the best predictors of certain components of job performance; i.e., giving extra effort, supporting peers, leadership and exhibiting personal discipline. Cognitive and perceptual-psychomotor ability tests scores were the best predictors of job-specific and general task proficiency. For all of the job performance factors, the best prediction occurred when both the cognitive ability, and the temperament-interest predictors were used. Similarly, Arneson, Davies & Hogan (1993) showed that both personality and cognitive ability measures correlated significantly with the performance of insurance claims adjusters. The predictors consisted of four cognitive ability tests from the Basic Skills Tests for Business Industry, Government and two personality predictors (the Hogan Personality Inventory measuring the Big Five personality factors, and the PROFILE measuring personality disorders based on the DSM-III). The performance criteria consisted of supervisory and peer

ratings, average percent of job performance, absences, disciplinary actions, and sick leave. In addition to the cognitive measures, the personality measures contributed significantly to the prediction of percent of performance achieved with R = .64 (Arneson et al., 1993).

Cognitive ability and personality factors each provide unique but significant contributions to job performance. Dunn et al. (1995) showed that individuals who were perceived by their managers as high in General Mental Ability (bright, quick to solve problems, and quick to learn new skills) performed better in their jobs than those who were lower in General Mental Ability (GMA). Concurrently, those who were perceived as high in conscientiousness (were consistently organized, systematic and neat) also performed better in their jobs than individuals considered as low in this trait (Dunn et al., 1995).

Criterion Measures

When looking at issues of validity, it must be determined what constitutes successful performance for the sample under investigation. Catano (1992, pg.4) states the criterion problem as one "of determining that the criterion chosen for use is a valid representation of the complex job performance domain under study". Debate exists as to the most appropriate criterion model. Theories range from multiple and complex criteria to a single representative criterion as being the best reflection of performance. In his evaluation of CF officer selection processes, Catano (1992) found training

criteria to be acceptable performance measures for estimating maximum performance. Training criteria are likely to provide better estimates of performance in combat situations than measures taken during routine work performance. The present study used this rationale behind its selection of a criteria measure for an NCM population. NCM training course ratings and course completion were used as criteria for predicting future NCM job performance in the CF.

Basic Recruit Training Assessment

Performance on the Basic Recruit Training Course (BRTC) was chosen as one of the criterion measures for NCM performance in this study. Basic Recruit Training is a training platform of basic military procedures for all NCM recruits. It provides recruits with motivation, knowledge and skills which the CF values regardless of the occupation or element to which the recruit is assigned. Additionally, it develops attributes that are helpful in making the transition from civilian to service life. During the eight-week training period, recruits receive instruction on different topics through formal instruction and course work. The instructor/student ratios range from 1/10 to 1/30 per course (Qualification Standard Publication A-P2-002-001/PS-H01; 1996).

The recruits are assessed on a number of different criteria. Table 3 presents this criteria with a brief description of the requirements for each area. A score is given to the recruit on each criterion; as well, each recruit is given an overall performance rating which is the sum of the individual criterion

scores.

Table 3
Training Performance Criteria (Qualification Standard Publication A-P2-002-001/PS-H01; 1996)

Criteria	Description	% Break Down
First Aid	Performance as based on St. John Ambulance testing procedures	10
Military Knowledge	Includes a knowledge of CF policies (Substance abuse, dress regulations etc.), CF roles and organization (Canadian Military History, Canada's role in NATO, NORAD etc.), Personnel and Administration (NCM General Specifications, Performance Objectives, Qualification Levels etc.).	10
Nuclear, Biological & Chemical Defence	Includes monitoring NBC condition, performing immediate action warning drills and immediate personal decontamination drills for nuclear, biological or chemical attack.	10
Physical Training	Includes activities involving an obstacle course, outdoor running tracks and sports fields.	30
Cross-Country Navigation	Activities include an orientation, reading maps, planning routes and navigation involving only a map or a compass.	10
Survival Under Field Conditions	Recruit must carry out personal camouflage and concealment, respond to weapons fire control orders, prepare field rations, purify drinking water etc.	10
Basic Drill Inspections	Includes standing at attention, marching and halting, saluting, forming squad etc.	20
		Total: 100

Training Course Completion.

The second criterion measure in this study is successful versus unsuccessful completion of course training. This was chosen as a performance criterion due to its practical significance for the CF. Level of training course performance, as predicted by cognitive and non-cognitive ability measures, is of theoretical interest to the CF and to the field of Vocational Psychology. However, measures that will accurately predict the Training Success versus Training Failure are of great practical as well as theoretical value. It costs the CF approximately $38,000 per recruit for the 8-week training program in St. Jean, Quebec (Pinsoneault, 1998). An improved screening process, that will decrease the number of potential drop-outs, could have enormous for the CF in both the short and long term.

Research Goals

The O'Keefe (1998) study looked at usefulness of personality measures, as measured with the MPA, on military job and academic performance. Concurrently, Woycheshin (1997) examined the role of vocational interests, as measured with the CWPI, on military job and academic performance. These studies suggest that non-cognitive ability measures have a small degree of correlation with CF job performance and that they may be useful as classification devices after an initial cognitive ability screening process. The present study investigates the predictive validity of a new CF measure of cognitive ability (CFAT) on NCM recruit training

performance. It also extends Woycheshin's (1997) and O'Keefe's (1998) studies to investigate if the addition of a personality measure (MPA) and an interest inventory (CWPI) add any incremental validity to the selection process with this NCM applicant sample.

Using a sample of NCM recruits, the goals of the present study are to:

1. Evaluate the validity of the newly implemented Canadian Forces Aptitude Test (CFAT) as a predictor of BRTC performance.

2. Investigate whether the addition of a personality measure, the MPA, improves on the predictive validity of the CFAT alone.

3. Investigate if the inclusion of an interest measure, the CWPI, will improve the predictive validity above and beyond the use of the CFAT and the MPA.

4. Examine if scores on the CFAT, MPA and CWPI validly predict successful completion of BRTC by NCM recruits.

5. Investigate whether any combination of individual subscales from the three measures predict either completion or performance in BRTC.

METHOD

Participants

Two hundred sixty-four NCM trainees, enrolled in an intensive eight-week training program, participated in this study. The training took place in Saint Jean Quebec from October to December of 1997. Applicants for the training program completed the GC3 as part of the screening process for entry into the program. Ninety-one percent of the sample were male and 77% of the participants were from Anglophone platoons. All of the participants shared the rank of entry-level NCM recruits. Table 4 shows the breakdown of the sample across gender and primary language.

Table 4
Stratification of NCM Sample Across Gender and Primary Language

	English	French
Male	n = 184 70%	n = 55 21%
Female	n = 19 7%	n = 5 2%

Note. N=263, Gender and Language information was not available for one recruit

Criterion Measures

Basic Recruit Training Assessment and Training Course Completion were the two criterion measures used in the study. In the first criterion measure, scores assessing training performance were used for the study's analyses. In the second criteria, two groups, Training Success and Training Failure, were used for the analyses. Both of these criterion measures were

considered to be acceptable estimates for future NCM job performance.

Measures

Canadian Forces Aptitude Test (CFAT)

The CFAT is composed of 60 items assigned to three subscales which measure verbal skills (15 items), spatial ability (15 items) and problem solving skills (30 items). Due to time constraints, recruits only completed 16 out of the 30 problem solving items, reducing the total number of items to 46. On the CFAT form, the items are arranged in ascending levels of difficulty and are designed to be fair with respect to gender and language (Zumbo & Hubley, 1997). The CFAT is a speeded test, meaning that items not completed in the appropriate span of time are scored as incorrect.

Reliability Analysis. Internal consistency estimates for the three subscales of the CFAT are presented in Table 5. The alpha coefficients for the sample of recruits were .87 for the Verbal Skills subscale, .88 for the Spatial Ability subscale and .91 for the Problem Solving subscale. These values are high measures of reliability and are suitable for selection purposes according to Pedhazur & Schmelkin (1991). To date, the only other examination of the internal consistency of CFAT subscales was performed by MacLennan (1997) who examined the original four subscales of the CFAT (Problem solving

(r=.84), Knowledge (r=.70), Pattern Analysis (r=.69) & Technical (r=.75)).[2] These values are presented in Table 6. With the exception of the Problem Solving scale, all of the alpha coefficients obtained by MacLennan are substantially lower than the ones obtained in the present study. This suggests that the new subscales are more internally consistent and are better indicators of general cognitive ability than the original four subscales proposed by Spinner (1991).

Table 5
Reliability Coefficients for the CFAT

CFAT Subscale	Alpha Coefficient (N = 210)	Number of Items
Verbal Skills	.87	15
Spatial Ability	.88	15
Problem Solving	.91	16

2. This four factor version of the CFAT was originally proposed by Spinner (1991) and validated against scales in the CFCB by Ibel & Cotton (1994). The technical scale was dropped due to its low reliability for females and the pattern subscale was replaced by the spatial abilities scale. The verbal abilities and the nonverbal abilities comprise the current verbal skills, and problem solving subscales of the CFAT.

Table 6
Reliability Coefficients for Original CFAT Subscales (MacLennan,1997)

CFAT Subscale	Alpha Coefficient (N = 17 280)	Number of Items
Problem Solving	.84	33
Knowledge	.70	18
Pattern	.69	15
Technical	.75	15

Note. In the above table, the Knowledge subscale partially comprised the current Verbal Skills subscale, the Pattern subscale became the Spatial Ability subscale and the Technical subscale was dropped due to its low reliability for females.

Measure of Personal Attributes (MPA)

The Measure of Personal Attributes (MPA) is a personality measure currently used in the CF for selection and classification purposes. It is the Canadian equivalent of the ABLE - the U.S. Army's Assessment of Background and Life Experiences. The MPA consists of 139 items and was modelled after the Able-133 which is a condensed version of the original 199 item test. The MPA assesses Work Orientation, Dominance, Dependability, Adjustment, Cooperativeness, Internal Control, and Physical Condition. It also includes Social Desirability and Nonrandom Response validity scales. There is no Canadian normative or empirical validation data for the MPA as optimal ABLE profiles are based on U.S. Army data.

Confirmatory Factor Analysis. O'Keefe (1998) noted that although the ABLE had been used in US Army selection research for a number of years, there was very little evidence confirming its factor structure. Using a military

sample of 658 NCMs, O'Keefe found that the MPA model did not adequately fit the data. He revised each subscale to include only those items which loaded on the factor with a weight of .40 or greater. The revised model fit the data better than the original (X^2 = 7515.11, df = 3799, p<.001; X^2/df = 1.97; GFI = .780; AGFI = .769) versus (X^2 = 14979.03, df = 7597, p<.001; X^2/df = 1.97; GFI = .707; AGFI = .696). This resulted in a reduction of items from 125 to 89. Because the present data set was too small to produce conclusive results using a confirmatory factor analysis, all analysis reported in this study are based on the 89-item version of the MPA developed by O'Keefe (1998). Table 7 displays the items that were removed from each subscale and the new maximum score for each subscale.

Table 7
Item Removal and new Maximum Score for MPA Subscales Based on O'Keefe's 1998 Confirmatory Factor Analysis

MPA Subscale	Items Removed	New Maximum Score
Achievement	9, 12, 26, 27, 42, 70, 78, 87, 89, 97, 100, 133	48
Dominance	10, 60, 93, 96, 112, 113	39
Dependability	15, 36, 53, 104, 110, 111, 120, 128, 130	36
Adjustment	13, 131	39
Cooperativeness	83	27
Internal Control	8, 81	33
Physical Condition	17	21

Reliability Analysis. Internal consistency estimates for each of the subscales of the MPA range from a moderate to high range of acceptability (.75 or higher). The alpha reliability coefficients for this sample of recruits were .88 for the Achievement subscale, .77 for Dominance, .75 for Dependability, .84 for Adjustment, .83 for Cooperativeness, .79 for Internal Control, and .82 for Physical Condition. Reliability estimates for the subscales of the MPA obtained by O'Keefe (1998), are presented in Table 8. The alpha coefficients for O'Keefe's military sample were .87 for Achievement, .84 for Dominance, .80 for Dependability, .77 for Cooperativeness, .82 for Internal Control, and .82 for Physical Condition. The similarity of the coefficients in the present study to those in the O'Keefe study suggest that the subscales of the MPA are internally consistent and are generalizable to other military populations.

Table 8
Reliability Coefficients for the MPA (89-item version)

MPA Subscale	Present Study (N = 183)	O'Keefe (1998) Study (N = 700)
Achievement	.88	.87
Dominance	.77	.84
Dependability	.75	.80
Adjustment	.84	.80
Cooperativeness	.83	.77
Internal Control	.79	.82
Physical Condition	.82	.82

The Canadian Work Preference Inventory (CWPI)

The Canadian Work Preference Inventory (CWPI) is a 50 item measure of career interests developed by Employment and Immigration Canada (Technical Manual,1992). It is based on Holland's theory in that it assesses five areas or "types" of career interest: Methodical, Objective, Innovative, Directive, and Social (Bognar, 1985). These factors are used to describe major patterns of individual interests which can be mapped on to various different career occupations. The instrument is primarily used as a counselling tool for individuals with an interest in investigating different career possibilities. It is relatively short in duration and has been normed with a mixed Anglophone and Francophone Canadian population.

Reliability Analysis. The internal consistency estimates for each of the subscales of the CWPI are .67 for the Methodical subscale, .87 for Objective, .69 for Innovative, .86 for Directive, and .84 for the Social subscale. Table 9 presents the coefficients for this study. Woycheshin (1997) obtained similar reliability estimates using a Military Sample. Specifically, he obtained .69 for the Methodical scale, .90 for the Objective scale, .73 for the Innovative scale, .88 for the Directive scale, .83 for the Social scale. In both cases, the Methodical and Innovative scales are less homogeneous in nature while the other three scales display a large degree of internal consistency. This trend is also displayed in the CWPI's technical manual where the Methodical and Innovative factors are less internally consistent (r= .82 and .77) than the other

subscales. Table 9 also presents the alpha coefficients in the Woycheshin study and in the CWPI Technical Manual.

Principle Component Analyses of the CWPI suggest that the proposed five-factor solution provides a satisfactory explanation for the data (Bognar, 1985).

Table 9
Reliability Coefficients for the CWPI

CWPI Subscale	Present Study (N = 186)	Woycheshin (1997) (N = 1847)	CWPI Technical Manual (N = 575)
Methodical	.67	.69	.82
Objective	.87	.90	.90
Innovative	.69	.73	.77
Directive	.86	.88	.88
Social	.84	.83	.86

Procedure

All of the recruits in five separate training platoons completed the CFAT, MPA and CWPI under supervised conditions at the training base in Saint Jean, Quebec. The tests were administered during the first week of the training program by Personnel Selection Officers on the base and were administered in the applicants' first language. The CFAT is a speeded test and recruits were given (30) minutes to complete the 46 item measure. 1.5 hours were given to complete the MPA and the CWPI measures. The recruits provided only their service number for identification purposes and for use in

matching the testing measures with their training performance evaluations.

Completed CF surveys which contain personal information become protected items and must remain in the care of qualified individuals. The completed, unscored measures were sent to PRT in Ottawa and the CFAT responses were entered into the CF database. Following completion of the BRT course, the data obtained from the CFAT, MPA, and CWPI were scored and matched by service number to the corresponding criteria scores. Missing responses for the MPA and the CWPI were replaced with the middle value (2 & 3 respectively). This method was chosen because the response patterns of the individuals indicated that the middle score would have been the most likely response. Mean substitution was not chosen because of its tendency to reduce variability amongst the items. Missing values in the CFAT were scored as incorrect. Of the 264 trainees, 138 completed the CFAT, MPA and the CWPI measures to be included in the analyses. One hundred twenty-six cases were missing entire test scores or sections of a test and were excluded from the analyses. Criterion data was not available for 49 recruits (20% of the sample) who did not complete the training course. These exclusions reduced the data set for the Training Performance criterion to 138 cases. The data set for the Training Success/Failure criterion was 264 cases.

Data Analysis

To assess the characteristics of the sample, descriptive statistics were examined with respect to subgroup differences, e.g., gender and language.

Reliability analyses were conducted on each of the three measures to assess the internal consistency of the subscales with the present sample of NCM recruits. Zero-order correlations were then computed to assess the linear relationship between the total scores and the subscales of the three predictors and training performance scores.

In light of the study's goals, three Hierarchical Regression Analyses were carried out to assess the criterion validity of the CFAT, the MPA and the CWPI. The first criterion measure in this study was supervisory ratings (score out of 100) of performance on the Basic Recruit Training Course for NCM recruits. In the first analysis, training performance was hierarchically regressed onto gender and language, the CFAT Total score, the MPA Total score and the CWPI Total score. The goal of this analysis was to assess the predictive value of the CFAT as a whole and the incremental validity added by the Total MPA score and the Total CWPI score. The total scores of the three measures were used for exploratory purposes; if the test contributed significantly to the proportion of variance accounted for in training performance, then the separate subscales could be investigated for their individual contributions. In the second analysis, performance was regressed onto gender and language followed in order by the individual subscales of the CFAT, the MPA and the CWPI. The goal of this analysis was to assess the contribution of the three CFAT subscales to predictive utility and the value added to this equation with the addition of the seven MPA subscales and the five CWPI subscales. In the third analysis, performance was hierarchically

regressed onto gender and language and onto the subscales that were significantly correlated to performance. The goal of this analysis was to explore if a combination of subscales, already found to be related to the criteria, would account for more variance in training performance than the sequence of predictors proposed in the first two hypotheses.

To assess the validity of the measures in predicting Training Success versus Training Failure, three Logistic Regression analyses were performed. In these analyses, Training Success/Failure was used as the categorical dependent variable. The CFAT, MPA and the CWPI were used to predict membership of the recruits into one of the two criteria groups. The method of entry of the predictor variables followed that used in the hierarchical regression analyses. In the first analysis, the dependent variable was regressed onto gender and language, the CFAT subscales, the MPA subscales, and the CWPI subscales. The goal of this analysis was to assess the probability of predicting group membership (training success versus training failure) using that order of entry for the subscales. In the second analysis, the dependent variable was regressed onto gender and language and then onto the Total scores of the CFAT, MPA and CWPI. Likewise, in the third analysis, Group Membership was regressed onto the subscales that correlated significantly to performance to explore any predictive contributions outside of the stated goals of the study.

RESULTS

Descriptive Statistics for the CFAT, MPA and CWPI

Means and standard deviations, by gender and language, for the CFAT, CWPI, and MPA are presented in Table 10 for those recruits who completed training. Table 11 presents this data for those recruits (23% of the original sample) who failed to complete training. Tables 12 - 15 present this data for each of the subscales of the three predictor measures. Demographic information for the Training Success and Training Failure groups is presented in Table 16. At least 30 recruits (17% of the sample) did not complete the CFAT, or sections of it, upon administration and 7 recruits failed to complete the MPA leading to unequal Ns in each of the groups.

In the Training Success group, there were no significant mean differences in training performance between either Males ($\bar{x}$ = 76.60) and females ($\bar{x}$ = 74.70) or between Anglophones ($\bar{x}$ = 76.37) and Francophones ($\bar{x}$ = 76.44). There were no significant differences between either males and females or between Anglophones and Francophones on overall test scores of the CFAT, MPA or the CWPI. However significant mean differences did occur between males and females on the Spatial Ability subscale of the CFAT ($t = 3.10$, $p<.01$) and the Objective subscale of the CWPI ($t = 2.02$, $p<.05$) with males scoring higher than females on both scales. In addition, Females scored significantly higher than males on the Social subscale of the CWPI ($t = 3.11$, $p<.01$). Anglophones and Francophones differed on the Verbal Skills subscale of the CFAT ($t = 3.27$, $p<.01$). Within the Training Failure group, 47

of this group were males and 2 were females. The male/female failure ratio was 23:1.

Table 10
Descriptive Statistics (Mean and Standard Deviation) of CFAT, MPA and CWPI for Recruits who Completed the Basic Recruit Training Course

	Training Successes	Anglophone Males	Anglophone Females	Francophone Males	Francophone Females
CFAT	29.61 (6.34) N = 148	30.12 (6.28) N = 102	26.80 (6.58) N = 15	30.00 (6.34) N = 27	24.50 (3.00) N = 4
MPA	204.87 (19.34) N = 179	204.82 (20.89) N = 129	204.88 (23.12) N = 17	205.07 (14.38) N = 30	204.67 (13.50) N = 3
CWPI	187.68 (19.37) N = 186	188.24 (19.71) N = 132	184.25 (22.46) N = 16	186.47 (17.58) N = 34	193.25 (10.47) N = 4

Note. Number of valid cases excluding missing observations = 138

Table 11
Descriptive Statistics (Mean and Standard Deviation) of CFAT, MPA and CWPI for Recruits who Failed to Complete the Basic Recruit Training Course

	Training Failures	Anglophone Males	Anglophone Females	Francophone Males	Francophone Females
CFAT	26.27 (6.91) N=49	25.61 (6.46) N=36	34.00 — N=1	28.18 (8.30) N=11	21.00 — N=1
MPA	193.66 (18.96) N=50	193.92 (19.17) N=36	175.00 — N=1	195.55 (20.03) N=11	210.00 — N=1
CWPI	184.12 (20.82) N=49	182.28 (21.35) N=36	154.00 — N=1	190.55 (16.41) N=11	176.00 — N=1

Note. Number of valid cases excluding missing observations = 49

Table 12
Descriptive Statistics by Subscale - CFAT, MPA & CWPI for Anglophone Males

	Completed Training			Did Not Complete Training		
	Mean	S.D.	N	Mean	S.D.	N
Anglophone Males						
CFAT Scales						
Verbal Skills	8.81	2.87	155	7.75	3.64	36
Spatial Ability	9.42	2.65	159	8.50	2.90	36
Problem Solving	10.62	3.77	140	9.36	4.23	36
MPA Scales						
Achievement	40.20	4.99	165	38.86	4.95	36
Dominance	29.45	4.87	166	26.22	4.92	36
Dependability	29.58	3.84	166	29.42	3.68	36
Adjustment	31.09	4.64	165	29.50	5.19	36
Cooperativeness	23.37	3.23	167	23.75	2.79	36
Internal Control	30.49	3.16	163	29.67	3.83	36
Physical Condition	17.00	3.07	166	16.50	3.47	36
CWPI Scales						
Methodical	39.68	4.89	168	39.44	4.25	36
Objective	35.26	8.45	168	34.92	9.55	36
Innovative	37.37	5.13	168	36.56	4.92	36
Directive	36.06	7.09	168	32.42	7.18	36
Social	38.60	6.65	168	36.02	4.51	36

Table 13
Descriptive Statistics by Subscale - CFAT, MPA & CWPI for Francophone Males

	Completed Training			Did Not Complete Training		
	Mean	S.D.	N	Mean	S.D.	N
Francophone Males						
CFAT Scales						
Verbal Skills	10.57	2.88	42	10.91	2.91	11
Spatial Ability	9.76	2.96	42	8.55	4.16	11
Problem Solving	10.13	3.21	38	8.73	4.73	11
MPA Scales						
Achievement	40.21	5.33	47	39.27	5.73	11
Dominance	30.35	5.27	48	30.18	4.77	11
Dependability	29.60	4.57	47	26.45	5.26	11
Adjustment	31.44	4.47	48	30.09	4.39	11
Cooperativeness	23.25	2.76	48	21.91	3.14	11
Internal Control	30.54	2.37	48	29.45	2.07	11
Physical Condition	17.40	2.65	48	18.18	2.40	11
CWPI Scales						
Methodical	39.24	4.18	45	37.27	4.80	11
Objective	35.40	7.98	45	37.73	6.07	11
Innovative	38.16	5.17	45	38.55	6.02	11
Directive	35.38	7.66	45	38.18	7.31	11
Social	39.29	4.91	45	38.02	5.85	11

Table 14
Descriptive Statistics by Subscale - CFAT, MPA & CWPI for Anglophone Females

	Completed Training		
	Mean	**S.D.**	**N**
Anglophone Females			
CFAT Scales			
Verbal Skills	8.72	2.93	18
Spatial Ability	7.53	3.10	17
Problem Solving	10.88	2.96	16
MPA Scales			
Achievement	39.13	8.12	15
Dominance	30.13	6.02	15
Dependability	31.00	4.19	15
Adjustment	33.13	5.11	15
Cooperativeness	23.20	2.83	15
Internal Control	30.20	2.93	15
Physical Condition	17.60	2.82	15
CWPI Scales			
Methodical	38.06	4.26	17
Objective	30.12	9.21	17
Innovative	37.47	5.77	17
Directive	34.29	6.79	17
Social	42.53	5.76	17

Note. One Anglophone female failed to complete training. With respect to confidentiality, scores for this individual are not presented.

Table 15
Descriptive Statistics by Subscale - CFAT, MPA & CWPI for Francophone Females

	Completed Training		
	Mean	**S.D.**	**N**
Francophone Females			
CFAT Scales			
Verbal Skills	8.40	2.07	5
Spatial Ability	7.80	1.92	5
Problem Solving	7.60	3.51	5
MPA Scales			
Achievement	36.50	6.19	4
Dominance	30.25	5.19	4
Dependability	31.25	2.50	4
Adjustment	33.25	7.04	4
Cooperativeness	21.50	3.70	4
Internal Control	32.25	0.96	4
Physical Condition	17.50	2.08	4
CWPI Scales			
Methodical	39.40	3.51	5
Objective	36.20	6.14	5
Innovative	36.80	6.14	5
Directive	39.20	8.70	5
Social	45.00	2.45	5

Note. One Francophone female failed to complete training. With respect to confidentiality, scores for this individual are not presented.

Table 16
Characteristics of Training Success and Training Failure Groups

	Training Successes		Training Failures	
	N	% of Sample	N	% of Sample
Male	192	90	47	96
Female	22	10	2	4
Anglophone	166	78	37	76
Francophone	48	22	12	24

Relationships Between CFAT, MPA and CWPI Subscales and Training Performance

The Pearson product moment correlation matrices for the scales of the CFAT, MPA, CWPI and the Performance criterion are presented in Tables 17-19. All subscales of each measure were highly intercorrelated with other subscales and measure totals.

CFAT

All of the CFAT subscales were significantly related to one another and to the CFAT total. Problem solving correlated significantly with Spatial Ability, r=.40, and Verbal Skills, r=.28, while Spatial Ability correlated with Verbal Skills, r=.23. All three subscales of the CFAT and the CFAT Total correlated significantly with Training Performance scores: Verbal Skills, r=.20; Problem Solving, r=.22; Spatial Ability, r=.24; Total, r=.29. The CFAT Total score, r=.24, Problem Solving, r=.20, and Spatial Ability, r=.16, correlated significantly with Training Success. Table 17 presents the summary of coefficients.

Table 17
Correlations for CFAT Total Score and CFAT Subscales and Performance Training Scores (Criterion 1)

	Mean	SD	1	2	3	4	5	6
1. Training Performance	76.38	4.58	—					
2. Training Success	.81	.39	—	—				
3. CFAT Total	29.61	6.34	.29**	.24**	–			
4. Verbal Skills	9.28	2.65	.20**	.10	.65**	–		
5. Spatial Ability	9.53	2.62	.24**	.16*	.68**	.23**	–	
6. Problem Solving	10.89	3.22	.22**	.20**	.80**	.28**	.40**	–

** P < .01
* P < .05
N for Training Performance correlations = 148
N for Training Success correlations = 264

Note. Training Performance = Mean training performance; Training Success = Training success versus training failure

MPA

In the MPA measure, Achievement significantly correlated with Adjustment, r=.45, Cooperation, r=.40, Dependability, r=.30, Dominance, r=.43, and Physical Condition, r=.47. Adjustment significantly correlated with Dependability, r=.29, Dominance, r=36, Internal control, r=.34, and physical condition, r=29. Cooperativeness significantly correlated with Adjustment, r=.32, Dependability, r=.40, and Internal control, r=.34. Dominance significantly correlated with Adjustment, r=.36, and Physical condition, r=.32. As can be seen in Table 18 none of the MPA scales, nor the MPA Total, correlated significantly with the Training Performance criterion. The MPA total

score, r=.23, Dominance, r=.27, Adjustment, r=.22, Internal Control, r=.15, and Achievement, r=.13, all correlated significantly with the Training Success criterion.

Table 18
Correlations for MPA Total Score and MPA Subscales and Training Performance Scores (Criterion 1)

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Perform	76.38	4.58	--								
2. Success	.81	.39	--	--							
3. Ach	40.50	5.27	.09	.13*	-						
4. Dom	30.34	4.81	.02	.27**	.43**	-					
5. Dep	29.93	3.93	.14	.12	.30**	.02	-				
6. Adj	31.81	4.45	.03	.22**	.45**	.36**	.29**	-			
7. Coop	23.33	3.75	.09	.01	.40**	.15*	.40**	.32**	-		
8. IC	30.76	2.78	.02	.15*	.50**	.12	.40**	.34**	.34**	-	
9. PC	17.22	2.87	.01	.05	.47**	.32**	.06	.29**	.04	.10	-
10. Pers Total	204.0	17.6	.09	.23**	.84*	.60**	.54**	.72**	.56**	.60**	.51**

** P < .01
* P < .05
N for Performance correlations = 179
N for Training Success/Failure correlations = 264

Note. Performance = Mean training performance; Success = Training Success versus Training Failure; Ach = Achievement; Dom = Dominance; Dep = Dependability; Adj = Adjustment; Coop = Cooperativeness; IC = Internal Control; PC = Physical Condition; Pers Tot = Total Personality Score.

CWPI

In the CWPI, the Methodical factor significantly correlated with the Directive factor, r=.16, the Innovative factor, r=.27, the Objective factor, r=.26, and the Social factor, r=.23. The Objective factor significantly correlated with the Innovative factor, r=.24, while the Social factor significantly correlated with

the Directive factor, r=.44, and the Innovative factor, r=.28. The CWPI total and two of the subscales correlated significantly with the Training Performance criterion: Total, r=.18; Directiveness, r=.24; and Innovativeness, r=.18. Table 19 presents a summary of the relationships. Only the Directive subscale, r=.14, correlated significantly with the Training Success criterion.

Table 19
Correlations for CWPI Total and CWPI Subscales and Training Performance Scores (Criterion 1)

	Mean	SD	1	2	3	4	5	6	7
1. Training Performance	76.38	4.58							
2. Training Success	.81	.39	–	–					
3. CWPI Total	187.68	19.37	.18*	-.07	–				
4. Methodical	39.62	4.73	.01	.06	.56**	–			
5. Objective	34.82	8.27	.06	-.03	.55**	.26**	–		
6. Innovative	37.63	5.21	.18*	.05	.66**	.27**	.24**	–	
7. Directive	36.40	7.05	.24**	.14*	.65**	.16*	.01	.36**	–
8. Social	39.21	6.53	.06	.02	.62**	.23**	-.02	.28**	.44**

** P < .01
* P < .05
N for Training Performance correlations = 186
N for Training Success/Failure correlations = 264

Note. Training Performance = Mean Training Performance; Training Success = Training Success versus Training Failure

Relationships between MPA, CWPI and CFAT Subscales

The MPA adjustment scale and the CWPI Directiveness scale were significantly related (r=.24). The other scales produced very weak or non-existent relationships. There were no significant relationships between the MPA and the CFAT subscales; however, there were significant correlations between the CFAT and the CWPI subscales. The CFAT's Spatial Ability subscale significantly correlated with the CWPI's Innovative (r=.28), Methodical (r=-.17), and Social (r=-.16) subscales. The Verbal Skills scale significantly linked to the Methodical (r=-.26) and the Objective (r=-.24) scales, while the Problem Solving scale significantly correlated with the Methodical scale of the CWPI (r=-.24). Table 20 presents the correlation matrix for all of the subscales.

Table 20
Correlations between Subscales of the MPA, CWPI and the CFAT

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Achievement	(.88)														
2. Dominance	.43**	(.77)													
3. Dependability	.30**	.02	(.75)												
4. Adjustment	.45**	.36**	.29**	(.84)											
5. Cooperation	.40**	.15*	.40**	.32**	(.83)										
6. Internal Control	.50**	.12	.40**	.34**	.34**	(.79)									
7. Physical Condition	.47**	.32**	.06	.29**	.04	.10	(.82)								
8. Methodical	.10	.06	.03	.04	.07	-.01	.06	(.67)							
9. Objective	.04	.05	.04	.02	.05	.04	-.10	.26**	(.87)						
10. Directive	.12	.05	.04	.24**	.10	.10	.15	.16*	.01	(.69)					
11. Innovative	.03	.08	-.01	.07	.06	.01	.04	.27**	.24**	.36**	(.86)				
12. Social	.03	.03	-.05	.03	-.04	-.01	.07	.23**	-.02	.44**	.28**	(.84)			
13. Problem Solving	-.03	-.06	-.12	.04	-.03	-.02	-.06	-.24**	-.14	.03	.10	-.14	(.91)		
14. Spatial Ability	.08	.16	.02	.04	.05	-.02	.03	-.17*	.11	.04	.28**	-.16*	.40**	(.88)	
15. Verbal Score	-.02	-.06	-.02	.01	.03	.16	.03	-.26**	-.24**	-.00	.01	-.11	.28**	.23**	(.87)

Note. Correlations in brackets represent subscale reliability
** P < .01
* P < .05

Hierarchical Regression Analyses

Hierarchical regression analyses were conducted to assess how well the screening measures predicted the training performance of those recruits who successfully completed the training course. The first two sets of analyses assessed the incremental validity of the CFAT, MPA and the CWPI in predicting training performance. These three measures were entered hierarchically into the regression equation. In the first analysis, Gender and Language were entered in Step 1 to control for these factors. In Step 2, the CFAT Total score was entered, in Step 3, the MPA total score was entered, and in Step 4, the CWPI Total score was entered. The total scores of the three measures accounted for 12.9% of the variance in training performance ($R = .36$, $F_{1, 113} = 5.32$, $p < .05$). The change in R^2 was significant with the addition of the CFAT total ($\Delta R^2 = .06$, $F_{2, 116} = 7.55$, $p < .01$) and with the addition of the CWPI total in the third step ($\Delta R^2 = .04$, $F_{1, 113} = 5.32$, $p < .05$). The four steps of the hierarchical regression are presented in Table 21.

Table 21
Results of Four Step Hierarchical Regression Analysis

Step	Independent Variables	Beta	R	R^2	ΔR^2	F	Sig F
1	Gender	-.15	.17	.03	.03	3.43	.19
	Language	-.07					
2	CFAT Total	.25	.30	.09	.06	7.55	.01
3	MPA Total	-.00	.30	.09	.00	.00	.98
4	CWPI Total	.21	.36	.13	.04	5.32	.02

In the second analysis, the subscales of the three measures, rather than the total score, were entered in each of the steps of the equation. In Step 1, Gender and Language were entered as control variables. In Step 2, the three subscales of the CFAT (problem solving, verbal skills and spatial ability) were added to the equation resulting in a non-significant change in R^2. In Step 3, performance was regressed onto the seven subscales of the MPA (cooperation, physical condition, internal control, dominance, dependence, adjustment and achievement) resulting in another non-significant change in R^2. In Step 4 of the analysis, performance was regressed onto the five subscales of the CWPI (social, methodical, objective, directive and innovative) also resulting in a non-significant change in R^2. The subscales of the three measures, entered in four steps, produced an R = .43 and accounted for 18.70% of the training performance. The tolerance values of each of the scales of the measures were examined for the potential of multicollinearity within the independent variables. None of the tolerance values were lower than .824 suggesting little possibility of overlap between the independent variables.

In the third analysis, subscales that significantly correlated with training performance were used as predictors and a three-step hierarchical regression analysis was performed to predict performance criteria. Table 22 displays the significant results obtained from this analysis. As in the previous analyses, performance was regressed onto gender and language in Step 1 to control for these factors. In Step 2, performance was regressed onto Spatial Ability,

Problem Solving and Verbal Skills. In Step 3, the criteria was regressed onto Innovativeness and Directiveness. In Step 1, the regression of performance onto gender and language resulted in a significant R^2 change ($R^2 = .047$, $F_{2, 140} = 3.43$, $p < .05$). The prediction improved with the addition of Problem Solving, Verbal Skills and Spatial Ability, ($\Delta R^2 = .063$, $F_{3, 137} = 3.16$, $p < .05$), and again with the addition of Directiveness and Innovativeness ($\Delta R^2 = .041$, $F_{2, 135} = 3.27$, $p < .05$). As individual contributors, the Problem Solving and the Directiveness subscales were the most indicative of training performance with significant Beta coefficients of .14 and .20 respectively. The independent variables in this analysis produced an overall R = .39 and accounted for 15.10% of the variance in performance.

Table 22
Results of Three Step Hierarchical Regression Analysis

Step	Independent Variables	Beta	R	R^2	ΔR^2	F	Sig F
1	Gender	-.19	.22	.05	.05	3.43	.04
	Language	-.10					
2	Problem Solving	.14	.33	.11	.06	3.22	.03
	Verbal Skills	.11					
	Spatial Ability	.11					
3	Directiveness	.20	.39	.15	.04	3.27	.04
	Innovativeness	.02					

Recruits Not Completing Basic Recruit Training Course (BRTC)

Data were obtained from fifty recruits who subsequently failed to complete the training course. This group, Training Failures, scored lower on the CFAT Total ($\bar{x}$ = 26.27 versus $\bar{x}$ = 29.81), the Spatial Ability ($\bar{x}$ = 8.48 vs. 9.53) and Problem Solving scales ($\bar{x}$ = 9.18 vs. 10.89), than those who completed training. There were also significant differences between these groups in the MPA Total ($\bar{x}$ = 193.66 vs. 204.03), Dominance ($\bar{x}$ = 27.04 vs. 30.38), Achievement ($\bar{x}$ = 38.74 vs. 40.47) and Internal Control ($\bar{x}$ = 29.66 vs. 30.76) subscales with the Training Failures again being lower on the three scales. The t-scores for these groups are presented in Table 23.

Table 23
Significant t-score Values (Successful versus Unsuccessful Completion of Training, Criterion 2)

	t-score	df	Significance	Confidence Interval (95%)
Independent Variable				
CFAT (Total Score)	3.38	193	.001	(1.48 - 5.60)
Spatial Ability	2.34	221	.020	(.16 - 1.92)
Problem Solving	2.93	197	.004	(.56 - 2.86)
MPA (Total Score)	3.60	226	.000	(4.70 - 16.04)
Dominance	4.32	232	.000	(1.81 - 4.86)
Achievement	2.05	230	.042	(.07, 3.39)
Internal Control	2.34	229	.020	(.17 - 2.02)

Logistic Regression Analysis

Three Logistic Regression Analyses were conducted to assess prediction of membership in the Training Success and Training Failure groups. The predictors were entered hierarchically in the same order as the previous sets of regression analyses. In the first analysis, gender and language were entered in the first step, the CFAT subscales in the second step, the MPA subscales in the third step, and the CWPI subscales in the forth step. In the first step, the full model produced a good fit with the constant-only model based on Gender and Language. In step 2, the CFAT subscales were entered into the equation. A test of the full model with these three predictors against a constant-only model was statistically reliable, $X^2(3, N = 168) = 186.98$, $p = .00$, indicating that the predictors, as a set, reliably distinguished between Training Success and Training Failure. In step 3, the inclusion of the MPA subscales also produced a significant difference between the full and the constant-only models, $X^2(7, N = 168) = 166.94$, $p = .01$. In Step 4, the addition of the CWPI subscales did not produce a significant difference between the models. Overall prediction rates using this sequence of independent variables were good. On the basis of the CFAT subscales, the success rate for correctly predicting group membership was 73.81%. This percentage remained the same with the addition of the MPA subscales and increased to 76.19% with the addition of the CWPI subscales. Figure 1 presents a matrix of prediction rates for the last step of the analysis. The contribution of the individual predictors during Step 4 of the equation is presented in Table 24.

Problem Solving and Dominance are the single most significant predictors of group membership (W=4.13, p<.05; W=8.20, p< .01) respectively. Odds ratios (Exp B) indicate that the probability of correctly predicting Training Success/Failure increases by a multiplicative factor of 1.15 with the addition of the Dominance factor, and by 1.14 with the addition of the Problem Solving factor.

Figure 1
Classification Table for Training Success, Training Failure Groups (Analysis 1)

		Predicted		
		Training Failure	Training Success	Percent Correct
Observed	Training Failure	21	28	42.86%
	Training Success	12	107	89.92%
			Overall Percent Correct	76.19%

Table 24
Contributions of Individual Predictors (Based on Separate Subscales) Entered in Four Hierarchical Steps (Analysis 1)

Predictor	B	S.E.	Wald	Sig	Exp B
1. Gender	1.35	.92	2.14	.14	3.84
Language	-.41	.50	.66	.42	.67
2. Verbal Skills	.02	.07	.10	.76	1.05
Spatial Ability	.10	.07	1.82	.18	1.13
Problem Solving	.12	.06	4.13	.04	1.14
3. Achievement	-.01	.05	.02	.89	.99
Physical Condition	-.10	.08	1.47	.23	.91
Internal Control	.04	.08	.22	.64	1.03
Dominance	.14	.05	8.20	.00	1.15
Dependability	.09	.06	2.53	.11	1.09
Cooperation	-.06	.07	.71	.40	.93
Adjustment	.04	.05	.52	.47	1.04
4. Methodical	.07	.05	2.49	.11	1.08
Objective	.00	.03	.03	.86	1.00
Innovative	-.06	.05	1.42	.23	.94
Directive	.05	.03	1.68	.19	1.05
Social	-.01	.04	.10	.75	.99

Note. B is the regression coefficient for predicting Training Success, SE is the standard error of the B coefficient, Wald is a test or a T-ratio that compares the coefficient to the model, Exp B is the odds ratio or the increase or decrease in odds of being in one category when the value of the predictor increases by one unit.

In the second set of analyses, the independent variables consisted of the total scores of the three measures. In step 1, Gender and Language were entered resulting in a non-significant difference in models. In step 2, the

inclusion of the CFAT total resulted in a full model that was significantly different from the constant-only model, $X^2(1, N = 168)$ 188.28, $p = .00$. The addition of the MPA total score in step 3 also resulted in a significant difference between these models, $X^2(1, N = 168)$ 178.20, $p = .00$. The inclusion of the CWPI total score did not result in a significant difference between the two models. As Figure 2 indicates, there was a 73.21% likelyhood of correctly predicting membership into Training Success and Training Failure using this sequence of independent variables. The contributions of each of the independent variables for this analysis are presented in Table 25. Both the CFAT Total and the MPA Total scores were significant individual predictors of group membership. The odds ratios are above 1.00 for each of the predictors indicating that the probability of correctly predicting Training Success/Failure increases with the addition of each of the total scores.

Figure 2
Classification Table for Training Success, Training Failure Groups (Analysis 2)

		Predicted		
		Training Failure	Training Success	Percent Correct
Observed	Training Failure	13	36	26.53%
	Training Success	9	110	92.44%
			Overall Percent Correct	73.21%

Table 25
Contributions of Individual Predictors (Analysis 2)

Predictor	B	S.E.	Wald	Sig	Exp B
1. Gender	1.59	.87	3.34	.07	4.92
Language	-.43	.44	.97	.33	.65
2. CFAT Total	.09	.03	10.27	.00	1.10
3. MPA Total	.03	.01	7.60	.01	1.03
4. CWPI Total	.01	.01	.35	.56	1.01

In the third logistic regression analysis, the predictors that produced significant t-score differences between the Training Success and the Training Failure groups were entered hierarchically into the equation. In Step 1, gender and language were entered producing a full model that was not statistically different from the constant-only model. In Step 2, Dominance, Internal Control and Achievement were entered into the equation resulting in a significant difference between the full model and the constant-only model, $X^2(3, N = 173) = 184.80$, $p = .00$. In Step 3, the inclusion of the Problem Solving and the Spatial Ability.subscales resulted in another significantly different full model, $X^2(2, N = 170) = 175.58$, $p = .01$. As indicated in Figure 3, the overall prediction rate of all of the independent variables in this analysis was 74.57%. Scores from this combination of predictors could predict with 91.94% accuracy, the recruits that would complete training and with 30.61% accuracy the recruits that would not. Table 26 presents the individual contributions of the predictors for this analysis. The Dominance and the

Problem Solving subscales significantly predicted group membership (W=8.02, p = .00; W=4.37, p = .04) respectively, while the Gender and Spatial Ability variables produced high but non-significant Wald values. The greatest Odds ratios existed for the Dominance, Problem Solving and Spatial Ability factors respectively (Exp B = 1.13, 1.11, 1.1).

Figure 3
Classification Table for Training Success, Training Failure Groups (Analysis 3)

		Predicted		
		Training Failure	Training Success	Percent Correct
Observed	Training Failure	15	34	30.61%
	Training Success	10	114	91.94%
			Overall Percent Correct	74.57%

Table 26
Contributions of Individual Predictors (Analysis 3)

Predictor	B	S.E.	Wald	Sig	Exp B
1. Gender	1.57	.91	3.03	.08	4.85
Language	-.45	.45	.99	.32	.64
2. Dominance	.12	.04	8.02	.00	1.13
Internal Control	.06	.07	.63	.43	1.06
Achievement	.01	.05	.07	.79	1.01
3. Problem Solving	.11	.05	4.37	.04	1.11
Spatial Ability	.10	.07	2.51	.11	1.11

DISCUSSION

The results of this study support the contention that non-cognitive ability measures add incremental validity to cognitive ability measures in the prediction of military training performance. Using BRTC performance scores as criteria, both the cognitive measure (CFAT) and the vocational interest measure (CWPI) predicted Training Performance. The personality measure, MPA, added little to this prediction. The CFAT Total, the CFAT subscales, and the MPA Dominance subscale reliably predicted Training Success.

Research Goal 1

The CFAT Total score and its three subscales were expected to predict Basic Recruit Training Performance. The data analyses confirmed this hypothesis with respect to the Training Performance scores of those recruits successfully completing the BRTC course. The CFAT Total score was highly correlated with the Training Performance criterion and accounted for a significant proportion of the variance in performance. The separate subscales of the CFAT did not account for a significant proportion of variance but were each significantly correlated with training performance evaluation scores. The CFAT Total score and the Spatial Ability subscale produced the strongest relationships with Training Performance scores. The Verbal Skills subscale produced the weakest relationship with the criteria. These results support those of MacLennan's (1997) validity generalization study where the CFAT Full scale was the most reliable and valid predictor of Training

Success/Failure. The CFAT Full scale consisted of Problem solving, Knowledge and Pattern subscales making it comparable to the CFAT total score in this study which consists of the Problem Solving, Spatial Ability and Verbal skills subscales. Ree et al. (1994) found that general cognitive ability, as measured by an overall score on the Armed Services Vocational Aptitude Battery (ASVAB), was the best predictor of job performance for 1000 US Air Force enlistees. The ASVAB, like the CFAT, is a multiple aptitude test battery composed of a number of subtests. These subtests are designed to represent major cognitive abilities and to provide an estimation of general mental ability, (Earles & Ree, 1992). Similarly, in a study of 10,000 US Military personnel, Schmidt & Hunter (1978; as cited in Hunter & Hunter, 1984) found that a test of general cognitive ability was the best predictor of performance across occupations. Therefore, estimates of general cognitive ability, which are based on a number of subtests measuring separate and distinct abilities, may be the most predictive and preferred measures. Individuals with higher scores of general cognitive ability will likely perform at higher levels in occupational and academic settings than those with lower scores of general cognitive ability.

The degree of association between the CFAT subscales and training course performance has a logical basis. Spatial Ability produced the strongest relationship followed by Problem Solving and Verbal Skills. The performance training criterion, which is representative of regular NCM duties within the CF, is based on scores from many practical activities such as Cross Country

Navigation, Survival Under Field Conditions, First Aid and Basic Drill Inspections. These activities require a greater need for Spatial Ability and Problem Solving Ability than for Verbal Skill prowess.

Surprisingly, the individual CFAT subscales were not significant predictors of training performance. The three predictors did not add any significant amount of variance to performance after the inclusion of Gender and Language. The separate subscales of the CFAT measure accounted for a total of 11% of the variance in training whereas the CFAT total score accounted for 9% of the variance.

Research Goal 2

The addition of the MPA total score and its subscales was expected to improve the prediction of training performance over and above the CFAT measure. None of the subscales nor the MPA total score produced significant correlations with course performance. Additionally, the MPA total and the subscales, when included as steps in the regression equations, did not produce a significant change in R^2 (ΔR^2 = 0.00). The MPA subscales however, were a better predictor of performance (R=.34) than the single MPA total score (R=.30). Neither the MPA total or the subscales produced a significant predictive relationship with performance over and above the CFAT measure.

Ashton (1998) obtained similar results in an analysis of broad versus narrow measures of personality. He investigated if a general integrity-related

factor of personality was more related to work performance (delinquency) than the narrower component factors of responsibility and risk-taking. He concluded that integrity related personality traits did not define a general factor of personality and that a broad measure of personality such as the Big Five was not likely to achieve maximum validity and that the use of narrow personality scales would optimally predict job performance.

Perhaps, as Ashton concluded, a broad measure of personality is not feasible for jobs or performance of a specific nature. If the measure of personality had assessed a single relevant construct needed for successful completion of the training course, the predictive validity may have been much higher. As Tett, Jackson and Rothstein (1991) point out, analyses of the requirements of a job, or performance related criterion, should give an idea about the specific personality variables that will relate to performance. For NCM Basic Recruit Training, a narrow measure of personality, on a trait such as leadership or team work, may be more effective in the identification of a desired personal attribute.

Another reason for the failure to obtain significant effects for the personality measure may be related to the measure itself. Other studies have produced discouraging results concerning the validity of the MPA. In the O'Keefe (1997) study, three of the seven scales of the MPA, Achievement, Dominance and Internal Control, produced significant but low correlations with performance. The proportion of variance accounted for by the three variables was relatively low (R^2 = .006). In a similar study using the ABLE, Bradley

(1997) found only a small degree of correlation between the ABLE subscales and basic training performance.

The type of training performance criterion used in the study may also have affected the degree of association between personality and performance. The performance criterion for recruits successfully completing the course was practical in nature and primarily measured knowledge, skills and abilities. A criterion measure that was more "in line" with the Big Five personality constructs may have produced a stronger relationship with the MPA subscales. The CF should consider designing a criterion measure that would specifically assess personality constructs such as Dominance, Adjustment, and Internal Control. A more relevant criterion could be used to measure both NCM training performance and to assess the predictive validity of personality measures such as the MPA.

Research Goal 3

The inclusion of the CWPI was expected to improve the predictive validity above and beyond the use of the CFAT and the MPA measures. Specifically, the CWPI total score and the subscales were expected to increase the prediction of BRTC performance scores. This hypothesis was partially supported. The CWPI Total score and the Innovative and the Directive subscales all correlated significantly with training performance scores. With the addition of the CWPI total score, variance in training performance increased from 9% to 14% (R=.36).

The Innovative factor measures problem solving and creativity in carrying out daily activities. The Directive factor is an indication of the individual's Leadership ability. It is not surprising that these two factors were strongly related to higher BRTC performance than the other three CWPI factors. Leadership is emphasized in military training courses. Therefore, a disposition towards directiveness is a valued trait and should lead to higher levels of training performance.

The relationship of the CWPI subscales correspond to the findings of Woycheshin's (1997) study in which he found that higher Innovative and Directive scores were associated with higher levels of performance. Using self report measures, and Personnel Evaluation Reports (PERs), Woycheshin concluded that leadership, as measured through the Directive factor, was important both in how members view their own performance and in how their performance is evaluated by superiors.

Leadership and ingenuity are important traits for individuals entering a military environment. The CWPI provides a reliable and valid assessment of these traits through the Directive and Innovative subscales and may lend value in the screening and selection of CF applicants.

Research Goal 4

The predictive validity of the three measures were also assessed against a Training Success/Failure criterion. The CFAT, MPA and CWPI were also expected to predict the proportion of recruits who successfully completed

BRTC versus those who did not. The independent subscales of the three measures, entered in the sequence: CFAT, MPA, CWPI, were more effective (overall) in predicting Training Success/Failure than the total scores of the CFAT, MPA and CWPI. The subscales of the CFAT and of the MPA significantly predicted group membership whereas the subscales of the CWPI did not. Specifically, the Problem Solving subscale of the CFAT and the Dominance subscale of the MPA were the most significant predictors of group membership when all of the subscales were entered sequentially.

It is not surprising that Problem Solving was a significant predictor of Training Success criterion. The Training Success group obtained a higher mean score on this scale than the Training Failure group ($\bar{x}$=10.62 versus $\bar{x}$= 9.36). The Problem Solving subscale also predicted higher training performance of recruits completing the course. The results for the Dominance subscale of the MPA are more surprising as neither the MPA nor its subscales were significantly related to the performance criteria. However, the ability of the Dominance subscale to effectively predict a recruit's likelihood of Training Success/Failure is of substantial importance to the CF. Perhaps, as Ashton (1998) suggested, a narrower measure of personality is necessary depending on the type of performance criterion being evaluated. Dominance may be a relevant construct to measure in prescreening applicants for NCM training programs.

Training Success and Training Failure groups performed differently on Spatial Ability scores of the CFAT and Achievement and Internal Control

Scores of the MPA. In all of these cases, the Training Success Group scored higher than the Training Failure group suggesting that superior Spatial Ability and personal traits of Achievement and Internal Control are important factors for the successful completion of BRTC.

Although the MPA did not exhibit any predictive validity in relation to how well recruits completing BRTC would perform, the results suggest that it could be a useful tool for predicting which recruits would successfully complete the training course. The Dominance subscale produced the strongest relationship with Training outcome followed (non-significantly) by Internal Control and Achievement. O'Keefe (1998) also obtained small but significant correlations with these subscales. Achievement, Dominance and Internal Control may also be important traits for successful training performance.

The CFAT total and MPA total scores were significantly higher for the recruits who successfully completed BRTC. The CFAT Total scores are meaningful as they are representative of a single composite measure of cognitive ability. The MPA total scores do not share this quality. The MPA subscales are heterogeneous in nature producing a meaningless overall measure. In this study however, the rationale behind using the MPA Total score in the analyses was to explore the contribution of the measure as a whole in predicting training performance and then to focus on the contribution of its specific subscales.

Contrary to expectations, the CWPI added very little to the predictive

outcome of Training Success/Training Failure. The inclusion of the CWPI subscales did improve the rate of prediction of group membership, but the independent subscales did not significantly predict the probability of a recruit succeeding at or failing the training course. The two groups did not differ on the five CWPI subscales or on the CWPI total score. Although the Innovative and Directive factors significantly predict how well a recruit performs in the training course, these factors appear to be less useful in predicting whether the same recruit will successfully complete the course. It is reasonable to assume that Leadership as measured through the Dominance and Achievement subscales of the MPA and through the Directive subscale of the CWPI, would be a relevant trait to both the completion of, and degree of performance within, the training course. Perhaps the trait of Internal Control, which is measured in the MPA but not in the CWPI, is the important missing link in predicting which recruits will successfully complete BRTC.

Research Goal 5

The fifth goal was to explore whether any combination of individual subscales from the three measures significantly predicted completion of or performance within BRTC. The CFAT subscales (Problem Solving, Verbal Skills and Spatial Ability) significantly correlated with training performance. The CWPI subscales (Directiveness and Innovativeness) also correlated significantly with training performance. This significant relationship became the criteria for inclusion in the third set of hierarchical regression analyses

used in this study. Each step of the regression analysis produced a significant change in the variance accounted for by the predictor variables. The inclusion of the CFAT subscales produced the greatest change in variance. However, gender and language also contributed significantly to the known variance (females performed significantly lower on the Spatial subscale than males, and Francophones performed significantly better on the Verbal Skills subscale than Anglophones). Directiveness and Innovativeness also added to the variance in performance when they were included in the third step of the analysis. This combination of variables accounted for 15% of the variance in performance.

When gender and language effects were controlled for, the Problem Solving, Verbal Skills, Spatial Ability, Directive and Innovative subscales provided the most efficient rate of prediction of future NCM training performance. Specifically, the Problem Solving and the Directive scales were the strongest predictors of superior performance in NCM training. This suggests that Leadership as assessed by the Directive subscale of the CWPI, and the ability to creatively work through tasks and to solve problems as assessed by the Problem Solving scale of the CFAT, are the most salient criterion for superior NCM training performance.

In terms of predicting Training Success/Failure, Dominance, Internal Control and Achievement from the MPA; and Problem Solving, and Spatial Ability from the CFAT provided the most efficient rate of prediction of training outcome. Similar to the training performance criterion, the Problem Solving

and the Dominance subscales were the strongest predictors of Training Success/Failure.

Range Restriction

The results in the present study were obtained from a sample of individuals (N = 264) who had been selected for non-officer rank positions within the CF. This creates a more homogeneous group than the total applicant group. Within the total sample, a greater range restriction occurred in the Training Performance Criteria group. Only those recruits who fully completed the three measures and who successfully completed the BRTC were included in the analyses involving this criteria measure (N=138). This range restriction was likely to have lowered all of the validity coefficients in the present study. An examination of the true estimates of range restriction cannot be made at this time, as normative data for the present version of the CFAT is not available.

Gender and Training Success

In the present study, a greater proportion of males failed or dropped out of BRTC than females. Within the Training Failure group, there were 47 males and only 2 females. One explanation for this differential is that women, as a minority within the NCM ranks, are making a highly conscious decision to attend BRTC and to work in a military environment. The challenges that face women and other minorities in the CF may lead to a greater determination to succeed in training. Although this is not a question within the present study,

future research should be conducted to investigate this observed trend.

Implications of Findings for the CF

Predicting Superior Training Performance

Both the CFAT Total score and its individual subscales predicted the level of performance of recruits who successfully completed the training course. The CFAT is a valid measure in that it significantly predicts the degree of training performance as rated by BRTC instructors. To achieve superior performance in BRTC, recruits are required to have specific cognitive abilities such as Spatial, Problem Solving and Verbal abilities. They should also possess Leadership ability, as assessed by the Innovative and Directive subscales of the CWPI. These findings have significant implications for the CF as they reaffirm the importance of non-cognitive ability measures as predictors of performance. To predict an applicant's degree of performance in BRTC, the CF should continue to use a cognitive ability score, as measured by Spatial Ability, Problem Solving Ability and Verbal Skills. However, the CF should also include non-cognitive measures, similar to the Directiveness and Innovativeness subscales of the CWPI when selecting for superior BRTC applicants.

The MPA added little to the prediction of superior performance in BRTC or in military occupations. Although significant differences occurred between the Training Success and the Training Failure groups on the Dominance, Achievement and Internal Control subscales, the measure as a whole was not

successful in predicting how well a recruit would perform in BRTC in the present study. Using different CF samples, O'Keefe (1997) and Bradley (1997) also demonstrated the low predictive validity of the MPA for military job occupations. The CF is currently investigating the use of another Big-Five personality measure, the Trait Self-Descriptive Inventory, developed by the U.S. Air Force for predictive purposes (O'Keefe, 1998). The present study endorses that view.

Predicting Training Success/Failure - The Economic Benefits of a Valid Screening System

Problem Solving Ability and Dominance were the strongest predictors of an applicant's likely-hood to successfully complete BRTC. To maximize the utility of its screening system, the CF should continue to use the CFAT and to assign extra weight to the Problem Solving and Spatial ability subscales. Because of the importance of Dominance in predicting Training Success, the CF should also include a non-cognitive measure to assess traits such as Dominance, Internal Control and Achievement.

The successful prediction of BRTC completion has large economic implications for the CF. Nineteen percent of the recruits starting BRTC, 49 out of 263, failed to complete the training course. The average cost for each recruit to enter BRTC is approximately $38,000. For a group of 250 this number increases to $9.5 million with a drop-out/failure cost of approximately $1.9 million per course. A more effective screening system within the CF has the potential to greatly decrease the costs associated with training drop-out or

failure. Both cognitive and non-cognitive ability measures are needed to create an optimal screening process.

Recommendations:

1. The CF should continue to use measures of cognitive ability (CFAT) for screening purposes. It should also use measures of non-cognitive ability to supplement the predictive validity of the CFAT

2. The CF should continue to use the CFAT and a supplementary measure of non-cognitive ability to predict which recruits will successfully complete BRTC as well as the "level of performance" of BRTC recruits who successfully complete the program

3. Due to the low predictive validity of the MPA in the present study and in other research studies, the CF should consider the use of an alternative measure of personality as a predictor of NCM Training Performance. In addition, a criterion measure that specifically assesses relevant personality factors, should be designed for use with NCM trainees

4. Further research should be conducted to investigate if a non-cognitive ability composite assessing "Leadership" or the combination of Dominance, Achievement and Internal Control, is successful for military screening and selection purposes.

5. Similar research studies using a larger and more diverse sample of participants should be conducted to verify the external validity of the research findings

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Appendix A

Descriptive Statistics

Descriptive Statistics

Variable GENDER

Mean	1.091	S.E. Mean	.018
Std Dev	.289	Variance	.083
Kurtosis	6.199	S.E. Kurt	.299
Range	1.000	Minimum	1.00
Maximum	2.00		

Valid observations - 263 Missing observations - 1

- -

Variable LANGUAGE

Mean	1.228	S.E. Mean	.026
Std Dev	.420	Variance	.177
Kurtosis	-.304	S.E. Kurt	.299
Range	1.000	Minimum	1.00
Maximum	2.00		

Valid observations - 263 Missing observations - 1

- -

Variable: Training Course Performance

Mean	76.385	S.E. Mean	.313
Std Dev	4.575	Variance	20.935
Kurtosis	.155	S.E. Kurt	.331
Range	26.760	Minimum	60.91
Maximum	87.67		

Valid observations - 214 Missing observations - 50

- -

Variable: Training Success/Failure

Mean	.811	S.E. Mean	.024
Std Dev	.393	Variance	.154
Kurtosis	.547	S.E. Kurt	.299
Range	1.000	Minimum	.00

Valid Observations - 264 Missing Observations - 0

Variable CFAT TOTAL SCORE

Mean	28.918	S.E. Mean	.466
Std Dev	6.510	Variance	42.385
Kurtosis	-.538	S.E. Kurt	.346
Range	31.000	Minimum	13.00
Maximum	44.00		

Valid observations - 195 Missing observations - 69

- -

Variable verbal score

Mean	9.127	S.E. Mean	.197
Std Dev	2.929	Variance	8.577
Kurtosis	-.050	S.E. Kurt	.327
Range	15.000	Minimum	.00
Maximum	15.00		

Valid observations - 220 Missing observations - 44

- -

Variable problem solving score

Mean	10.472	S.E. Mean	.257
Std Dev	3.619	Variance	13.099
Kurtosis	.047	S.E. Kurt	.343
Range	15.000	Minimum	1.00
Maximum	16.00		

Valid observations - 199 Missing observations - 65

- -

Variable spatial ability

Mean	9.300	S.E. Mean	.186
Std Dev	2.778	Variance	7.716
Kurtosis	-.013	S.E. Kurt	.324
Range	15.000	Minimum	.00
Maximum	15.00		

Valid observations - 223 Missing observations - 41

Number of valid observations (listwise) = 118.00

Variable: MPA Total score

Mean	201.754	S.E. Mean	1.221
Std Dev	18.442	Variance	340.124
Kurtosis	1.356	S.E. Kurt	.321
Range	117.000	Minimum	126.00
Maximum	243.00		

Valid observations - 228 Missing observations - 36

- -

Variable DOMINANCE

Mean	29.662	S.E. Mean	.328
Std Dev	5.024	Variance	25.237
Kurtosis	.068	S.E. Kurt	.317
Range	31.000	Minimum	15.00
Maximum	46.00		

Valid observations - 234 Missing observations - 30

- -

Variable ADJUSTMENT

Mean	31.322	S.E. Mean	.306
Std Dev	4.670	Variance	21.805
Kurtosis	-.003	S.E. Kurt	.318
Range	22.000	Minimum	17.00
Maximum	39.00		

Valid observations - 233 Missing observations - 31

- -

Variable COOPERATION

Mean	23.306	S.E. Mean	.202
Std Dev	3.104	Variance	9.632
Kurtosis	1.600	S.E. Kurt	.316
Range	17.000	Minimum	10.00
Maximum	27.00		

Valid observations - 235 Missing observations - 29

Number of valid observations (listwise) = 118.00

Variable DEPENDABILITY

Mean	29.695	S.E. Mean	.262
Std Dev	3.996	Variance	15.971
Kurtosis	-.150	S.E. Kurt	.318
Range	18.000	Minimum	18.00
Maximum	36.00		

Valid observations - 233 Missing observations - 31

- -

Variable INTERNAL CONTROL

Mean	30.519	S.E. Mean	.195
Std Dev	2.966	Variance	8.799
Kurtosis	6.761	S.E. Kurt	.319
Range	20.000	Minimum	13.00
Maximum	33.00		

Valid observations - 231 Missing observations - 33

- -

Variable ACHIEVEMENT

Mean	40.095	S.E. Mean	.349
Std Dev	5.319	Variance	28.294
Kurtosis	1.282	S.E. Kurt	.318
Range	29.000	Minimum	19.00
Maximum	48.00		

Valid observations - 232 Missing observations - 32

- -

Variable CWPI Total score

Mean	186.940	S.E. Mean	1.284
Std Dev	19.685	Variance	387.492
Kurtosis	.271	S.E. Kurt	.316
Range	114.000	Minimum	119.00
Maximum	233.00		

Valid observations - 235 Missing observations - 29

Number of valid observations (listwise) = 118.00

Variable DIRECTIVE

Mean	35.868	S.E. Mean	.470
Std Dev	7.199	Variance	51.824
Kurtosis	.194	S.E. Kurt	.316
Range	38.000	Minimum	12.00
Maximum	50.00		

Valid observations - 235 Missing observations - 29

- -

Variable INNOVATIVE

Mean	37.515	S.E. Mean	.338
Std Dev	5.183	Variance	26.866
Kurtosis	.819	S.E. Kurt	.316
Range	33.000	Minimum	15.00
Maximum	48.00		

Valid observations - 235 Missing observations - 29

- -

Variable METHODICAL

Mean	39.472	S.E. Mean	.306
Std Dev	4.689	Variance	21.985
Kurtosis	-.035	S.E. Kurt	.316
Range	26.000	Minimum	24.00
Maximum	50.00		

Valid observations - 235 Missing observations - 29

- -

Variable OBJECTIVE

Mean	34.932	S.E. Mean	.551
Std Dev	8.442	Variance	71.269
Kurtosis	-.300	S.E. Kurt	.316
Range	38.000	Minimum	12.00
Maximum	50.00		

Valid observations - 235 Missing observations - 29

Number of valid observations (listwise) = 118.00

Variable SOCIAL

Mean	39.441	S.E. Mean	.224
Std Dev	4.986	Variance	24.860
Kurtosis	-.216	S.E. Kurt	.357
Range	20.000	Minimum	27.00
Maximum	47.00		

Valid observations - 183 Missing observations - 81

- -

Variable PHYSCON

Mean	17.137	S.E. Mean	.193
Std Dev	2.950	Variance	8.702
Kurtosis	-.100	S.E. Kurt	.317
Range	13.000	Minimum	8.00
Maximum	21.00		

Valid observations - 234 Missing observations - 30

Appendix B

Correlation Matrices

- - Correlation Coefficients - -

Note. Criteria1 = Training Performance Score, Criteria2 = Training Success / Failure, CFATTOT = CFAT total score, SPATSCOR = spatial ability score, VERSCOR = verbal skills score, PSSCORE = problem solving score, PERSONAL = MPA total score, Achieve = achievement score, DOMN = dominance score, DEPN = dependability score, ADJUST = adjustment score, COOP = cooperation score, INTCON = internal control score, PHYSCON = physical condition score, CWPI = CWPI total score, METHOD = methodical score, OBJECT = objective score, DIREC directive score, INNOVAT = innovative score, SOCIAL = social score

	Criteria1	Criteria2	CFATTOT	SPATSCOR	VERSCORE	PSSCORE
Criteria1	1.0000	.	.2767	.2415	.2018	.2152
	(214)	(214)	(146)	(174)	(171)	(150)
	P= .	P= .	P= .001	P= .001	P= .008	P= .008
Criteria2	.	1.0000	.2367	.1552	.0981	.2040
	(214)	(264)	(195)	(223)	(220)	(199)
	P= .	P= .	P= .001	P= .020	P= .147	P= .004
CFATTOT	.2767	.2367	1.0000	.6299	.6372	.7964
	(146)	(195)	(195)	(195)	(195)	(195)
	P= .001	P= .001	P= .	P= .000	P= .000	P= .000
SPATSCOR	.2415	.1552	.6299	1.0000	.1238	.2872
	(174)	(223)	(195)	(223)	(216)	(198)
	P= .001	P= .020	P= .000	P= .	P= .069	P= .000
VERSCORE	.2018	.0981	.6372	.1238	1.0000	.2683
	(171)	(220)	(195)	(216)	(220)	(196)
	P= .008	P= .147	P= .000	P= .069	P= .	P= .000
PSSCORE	.2152	.2040	.7964	.2872	.2683	1.0000
	(150)	(199)	(195)	(198)	(196)	(199)
	P= .008	P= .004	P= .000	P= .000	P= .000	P= .
PERSONAL	.0848	.2331	.0727	.0596	.0595	.0327
	(178)	(228)	(171)	(191)	(189)	(174)
	P= .260	P= .000	P= .344	P= .413	P= .416	P= .668
ACHIEV	.0862	.1338	.0715	.0631	.0408	.0252
	(182)	(232)	(172)	(194)	(192)	(175)
	P= .247	P= .042	P= .352	P= .382	P= .575	P= .740
DOMN	.0226	.2727	.1234	.1473	.0586	.0464
	(184)	(234)	(174)	(196)	(194)	(177)
	P= .761	P= .000	P= .105	P= .041	P= .417	P= .539
DEPN	.1367	.1226	-.0465	-.0268	-.0146	-.0245
	(183)	(233)	(174)	(195)	(193)	(177)
	P= .065	P= .062	P= .542	P= .710	P= .840	P= .746
ADJUST	.0270	.2178	.0664	.0309	.0490	.0493
	(183)	(233)	(173)	(195)	(193)	(176)
	P= .717	P= .001	P= .385	P= .668	P= .498	P= .516

- - Correlation Coefficients - -

	CRITER1	CRITER2	CFATTOT	SPATSCOR	VERSCORE	PSSCORE
COOPER	.0848	.0145	-.0227	-.0164	-.0181	-.0281
	(185)	(235)	(175)	(197)	(195)	(178)
	P= .251	P= .825	P= .765	P= .819	P= .801	P= .710
INTCONT	.0218	.1526	.0655	.0074	.0704	.0656
	(181)	(231)	(173)	(194)	(192)	(176)
	P= .771	P= .020	P= .392	P= .918	P= .332	P= .387
PHYSCON	.0054	.0490	.0144	.0031	.0761	-.0131
	(184)	(234)	(174)	(196)	(194)	(177)
	P= .942	P= .456	P= .850	P= .965	P= .291	P= .863
CWPI	.1833	.0736	-.0829	.0745	-.1169	-.1675
	(186)	(235)	(192)	(220)	(217)	(196)
	P= .012	P= .261	P= .253	P= .271	P= .086	P= .019
METHODIC	.0049	.0608	-.2419	-.0988	-.2204	-.2093
	(186)	(235)	(192)	(220)	(217)	(196)
	P= .947	P= .354	P= .001	P= .144	P= .001	P= .005
OBJECTIV	.0616	-.0253	-.1326	.1387	-.2072	-.2266
	(186)	(235)	(192)	(220)	(217)	(196)
	P= .404	P= .700	P= .067	P= .040	P= .002	P= .001
DIRECTIV	.2348	.1437	.1157	.0764	.0578	.0425
	(186)	(235)	(192)	(220)	(217)	(196)
	P= .001	P= .028	P= .110	P= .259	P= .397	P= .554
INNOVATI	.1809	.0450	.1754	.2161	.0622	.0527
	(186)	(235)	(192)	(220)	(217)	(196)
	P= .013	P= .492	P= .015	P= .001	P= .362	P= .463
SOCIAL	.0642	.0174	-.1616	-.1425	-.0403	-.1416
	(186)	(235)	(192)	(220)	(217)	(196)
	P= .384	P= .791	P= .025	P= .035	P= .555	P= .048

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	PERSONAL	ACHIEV	DOMN	DEPN	ADJUST	COOPER
CRITER1	.0848	.0862	.0226	.1367	.0270	.0848
	(178)	(182)	(184)	(183)	(183)	(185)
	P= .260	P= .247	P= .761	P= .065	P= .717	P= .251
CRITER2	.2331	.1338	.2727	.1226	.2178	.0145
	(228)	(232)	(234)	(233)	(233)	(235)
	P= .000	P= .042	P= .000	P= .062	P= .001	P= .825
CFATTOT	.0727	.0715	.1234	-.0465	.0664	-.0227
	(171)	(172)	(174)	(174)	(173)	(175)
	P= .344	P= .352	P= .105	P= .542	P= .385	P= .765
SPATSCOR	.0596	.0631	.1470	-.0268	.0309	-.0164
	(191)	(194)	(196)	(195)	(195)	(197)
	P= .413	P= .382	P= .040	P= .710	P= .668	P= .819
VERSCORE	.0595	.0408	.0586	-.0146	.0490	-.0181
	(189)	(192)	(194)	(193)	(193)	(195)
	P= .416	P= .575	P= .417	P= .840	P= .498	P= .801
PSSCORE	.0327	.0252	.0464	-.0245	.0493	-.0281
	(174)	(175)	(177)	(177)	(176)	(178)
	P= .668	P= .740	P= .539	P= .746	P= .516	P= .710
PERSONAL	1.0000	.8437	.6399	.5018	.7471	.5254
	(228)	(228)	(228)	(228)	(228)	(228)
	P= .	P= .000	P= .000	P= .000	P= .000	P= .000
WORKO	.8437	1.0000	.4783	.2929	.5044	.3634
	(228)	(232)	(231)	(231)	(232)	(232)
	P= .000	P= .	P= .000	P= .000	P= .000	P= .000
DOMN	.6399	.4783	1.0000	.0044	.4378	.1033
	(228)	(231)	(234)	(232)	(232)	(234)
	P= .000	P= .000	P= .	P= .946	P= .000	P= .115
DEPN	.5018	.2929	.0044	1.0000	.2546	.3979
	(228)	(231)	(232)	(233)	(232)	(233)
	P= .000	P= .000	P= .946	P= .	P= .000	P= .000
ADJUST	.7471	.5044	.4378	.2546	1.0000	.2852
	(228)	(232)	(232)	(232)	(233)	(233)
	P= .000	P= .000	P= .000	P= .000	P= .	P= .000

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	PERSONAL	ACHIEV	DOMN	DEPN	ADJUST	COOPER
COOPER	.5254	.3634	.1033	.3979	.2852	1.0000
	(228)	(232)	(234)	(233)	(233)	(235)
	P= .000	P= .000	P= .115	P= .000	P= .000	P= .
INTCONT	.6442	.5235	.1922	.3763	.4076	.3474
	(228)	(230)	(230)	(230)	(231)	(231)
	P= .000	P= .000	P= .003	P= .000	P= .000	P= .000
PHYSCON	.5461	.4927	.3857	.0300	.3268	.0398
	(228)	(232)	(233)	(232)	(233)	(234)
	P= .000	P= .000	P= .000	P= .649	P= .000	P= .545
CWPI	.2335	.2278	.1863	.0112	.2021	.0860
	(202)	(205)	(207)	(206)	(206)	(208)
	P= .001	P= .001	P= .007	P= .873	P= .004	P= .217
METHODIC	.1182	.1348	.0420	.0923	.0189	.1613
	(202)	(205)	(207)	(206)	(206)	(208)
	P= .094	P= .054	P= .548	P= .187	P= .787	P= .020
OBJECTIV	.0626	.0785	.0455	-.0071	.0605	.0497
	(202)	(205)	(207)	(206)	(206)	(208)
	P= .376	P= .263	P= .515	P= .920	P= .388	P= .476
DIRECTIV	.2955	.2439	.2576	-.0071	.3166	.0261
	(202)	(205)	(207)	(206)	(206)	(208)
	P= .000	P= .000	P= .000	P= .920	P= .000	P= .708
INNOVATI	.1322	.1239	.1523	-.0033	.1028	.0318
	(202)	(205)	(207)	(206)	(206)	(208)
	P= .061	P= .077	P= .028	P= .962	P= .141	P= .648
SOCIAL	.1068	.1226	.0715	-.0155	.0920	.0228
	(202)	(205)	(207)	(206)	(206)	(208)
	P= .130	P= .080	P= .306	P= .825	P= .189	P= .744

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	INTCONT	PHYSCON	CWPI	METHODIC	OBJECTIV	DIRECTIV
CRITER1	.0218	.0054	.1833	.0049	.0616	.2348
	(181)	(184)	(186)	(186)	(186)	(186)
	P= .771	P= .942	P= .012	P= .947	P= .404	P= .001
CRITER2	.1526	.0490	.0736	.0608	-.0253	.1437
	(231)	(234)	(235)	(235)	(235)	(235)
	P= .020	P= .456	P= .261	P= .354	P= .700	P= .028
CFATTOT	.0655	.0144	-.0829	-.2419	-.1326	.1157
	(173)	(174)	(192)	(192)	(192)	(192)
	P= .392	P= .850	P= .253	P= .001	P= .067	P= .110
SPATSCOR	.0074	.0031	.0745	-.0988	.1387	.0764
	(194)	(196)	(220)	(220)	(220)	(220)
	P= .918	P= .965	P= .271	P= .144	P= .040	P= .259
VERSCORE	.0704	.0761	-.1169	-.2204	-.2072	.0578
	(192)	(194)	(217)	(217)	(217)	(217)
	P= .332	P= .291	P= .086	P= .001	P= .002	P= .397
PSSCORE	.0656	-.0131	-.1675	-.2003	-.2266	.0425
	(176)	(177)	(196)	(196)	(196)	(196)
	P= .387	P= .863	P= .019	P= .005	P= .001	P= .554
PERSONAL	.6442	.5461	.2335	.1182	.0626	.2955
	(228)	(228)	(202)	(202)	(202)	(202)
	P= .000	P= .000	P= .001	P= .094	P= .376	P= .000
ACHIEV	.5235	.4927	.2278	.1348	.0785	.2439
	(230)	(232)	(205)	(205)	(205)	(205)
	P= .000	P= .000	P= .001	P= .054	P= .263	P= .000
DOMN	.1922	.3857	.1863	.0420	.0455	.2576
	(230)	(233)	(207)	(207)	(207)	(207)
	P= .003	P= .000	P= .007	P= .548	P= .515	P= .000
DEPN	.3763	.0300	.0112	.0923	-.0071	-.0071
	(230)	(232)	(206)	(206)	(206)	(206)
	P= .000	P= .649	P= .873	P= .187	P= .920	P= .920
ADJUST	.4076	.3268	.2021	.0189	.0605	.3166
	(231)	(233)	(206)	(206)	(206)	(206)
	P= .000	P= .000	P= .004	P= .787	P= .388	P= .000

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	INTCONT	PHYSCON	CWPI	METHODIC	OBJECTIV	DIRECTIV
COOPER	.3474	.0398	.0860	.1613	.0497	.0261
	(231)	(234)	(208)	(208)	(208)	(208)
	P= .000	P= .545	P= .217	P= .020	P= .476	P= .708
INTCONT	1.0000	.2013	.1380	.0594	.0820	.1517
	(231)	(231)	(205)	(205)	(205)	(205)
	P= .	P= .002	P= .048	P= .398	P= .243	P= .030
PHYSCON	.2013	1.0000	.1231	.0163	-.0692	.2619
	(231)	(234)	(207)	(207)	(207)	(207)
	P= .002	P= .	P= .077	P= .816	P= .322	P= .000
CWPI	.1380	.1231	1.0000	.5410	.5717	.6651
	(205)	(207)	(235)	(235)	(235)	(235)
	P= .048	P= .077	P= .	P= .000	P= .000	P= .000
METHODIC	.0594	.0163	.5410	1.0000	.2446	.1281
	(205)	(207)	(235)	(235)	(235)	(235)
	P= .398	P= .816	P= .000	P= .	P= .000	P= .050
OBJECTIV	.0820	-.0692	.5717	.2446	1.0000	.0645
	(205)	(207)	(235)	(235)	(235)	(235)
	P= .243	P= .322	P= .000	P= .000	P= .	P= .325
DIRECTIV	.1517	.2619	.6651	.1281	.0645	1.0000
	(205)	(207)	(235)	(235)	(235)	(235)
	P= .030	P= .000	P= .000	P= .050	P= .325	P= .
INNOVATI	.0490	.0827	.6751	.2762	.2158	.3864
	(205)	(207)	(235)	(235)	(235)	(235)
	P= .485	P= .236	P= .000	P= .000	P= .001	P= .000
SOCIAL	.0625	.0977	.6357	.2429	.0131	.4327
	(205)	(207)	(235)	(235)	(235)	(235)
	P= .374	P= .161	P= .000	P= .000	P= .841	P= .000

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	INNOVATI	SOCIAL
CRITER1	.1809	.0642
	(186)	(186)
	P= .013	P= .384
CRITER2	.0450	.0174
	(235)	(235)
	P= .492	P= .791
CFATTOT	.1754	-.1616
	(192)	(192)
	P= .015	P= .025
SPATSCOR	.2161	-.1425
	(220)	(220)
	P= .001	P= .035
VERSCORE	.0622	-.0403
	(217)	(217)
	P= .362	P= .555
PSSCORE	.0527	-.1416
	(196)	(196)
	P= .463	P= .048
PERSONAL	.1322	.1068
	(202)	(202)
	P= .061	P= .130
ACHIEV	.1239	.1226
	(205)	(205)
	P= .077	P= .080
DOMN	.1523	.0715
	(207)	(207)
	P= .028	P= .306
DEPN	-.0033	-.0155
	(206)	(206)
	P= .962	P= .825
ADJUST	.1028	.0920
	(206)	(206)
	P= .141	P= .189

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	INNOVATI	SOCIAL
COOPER	.0318	.0228
	(208)	(208)
	P= .648	P= .744
INTCONT	.0490	.0625
	(205)	(205)
	P= .485	P= .374
PHYSCON	.0827	.0977
	(207)	(207)
	P= .236	P= .161
CWPI	.6751	.6357
	(235)	(235)
	P= .000	P= .000
METHODIC	.2762	.2429
	(235)	(235)
	P= .000	P= .000
OBJECTIV	.2158	.0131
	(235)	(235)
	P= .001	P= .841
DIRECTIV	.3864	.4327
	(235)	(235)
	P= .000	P= .000
INNOVATI	1.0000	.3478
	(235)	(235)
	P= .	P= .000
SOCIAL	.3478	1.0000
	(235)	(235)
	P= .000	P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

Appendix C

Hierarchical Regression Analyses

Hierarchical Regression Analysis # 1
(Change in F Statistics not presented)

* * * * M U L T I P L E R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. Training Performance

Block Number 1. Method: Enter GENDER LANGUAGE

Variable(s) Entered on Step Number
1.. LANGUAGE
2.. GENDER

Multiple R	.16786
R Square	.02818
Adjusted R Square	.01142
Standard Error	4.53144

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	69.06549	34.53275
Residual	116	2381.94057	20.53397

F = 1.68174 Signif F = .1906

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-2.263514	1.380641	-.150183	-1.639	.1038
LANGUAGE	-.782433	1.036086	-.069178	-.755	.4517
(Constant)	80.160070	1.969787		40.695	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
CFATTOT	.254314	.248226	.925208	2.748	.0070
MPA	.011345	.011501	.997382	.123	.9021
CWPI	.168261	.170058	.991092	1.851	.0668

End Block Number 1 All requested variables entered.

* * * * MULTIPLE REGRESSION * * * *

Equation Number 1 Dependent Variable.. Training Performance

Block Number 2. Method: Enter CFATTOT

Variable(s) Entered on Step Number
3.. CFATTOT

Multiple R	.29675
R Square	.08806
Adjusted R Square	.06427
Standard Error	4.40866

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	215.83188	71.94396
Residual	115	2235.17417	19.43630

F = 3.70153 Signif F = .0138

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.225529	1.395333	-.081313	-.878	.3816
LANGUAGE	-.726212	1.008221	-.064207	-.720	.4728
CFATTOT	.187259	.068145	.254314	2.748	.0070
(Constant)	73.363566	3.128885		23.447	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
MPA	-.002156	-.002252	.923043	-.024	.9809
CWPI	.200693	.207870	.912470	2.269	.0251

End Block Number 2 All requested variables entered.

* * * * MULTIPLE REGRESSION * * * *

Equation Number 1 Dependent Variable.. Training Performance

Block Number 3. Method: Enter MPA Total

Variable(s) Entered on Step Number
4.. MPA Total

Multiple R	.29675
R Square	.08806
Adjusted R Square	.05607
Standard Error	4.42794

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	4	215.84322	53.96081
Residual	114	2235.16283	19.60669

F = 2.75216 Signif F = .0314

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.224001	1.402876	-.081212	-.872	.3848
LANGUAGE	-.725796	1.012778	-.064171	-.717	.4751
CFATTOT	.187350	.068547	.254437	2.733	.0073
MPA	-5.58679E-04	.023231	-.002156	-.024	.9809
(Constant)	73.472682	5.519207		13.312	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
CWPI	.208374	.212026	.906862	2.306	.0229

End Block Number 3 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Performance

Block Number 4. Method: Enter CWPI

Variable(s) Entered on Step Number
5.. CWPI

Multiple R	.35925
R Square	.12906
Adjusted R Square	.09052
Standard Error	4.34638

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	5	316.32498	63.26500
Residual	113	2134.68107	18.89098

F = 3.34895 Signif F = .0074

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.065890	1.378739	-.070721	-.773	.4411
LANGUAGE	-.914055	.997467	-.080815	-.916	.3614
CFATTOT	.208078	.067882	.282589	3.065	.0027
MPA	-.010561	.023211	-.040750	-.455	.6500
CWPI	.051210	.022204	.208374	2.306	.0229
(Constant)	65.341691	6.463684		10.109	.0000

End Block Number 4 All requested variables entered.

Hierarchical Regression Analysis # 2
(Change in F statistics not presented)

* * * * M U L T I P L E R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. Training Performance

Block Number 1. Method: Enter GENDER LANGUAGE

Variable(s) Entered on Step Number
1.. LANGUAGE
2.. GENDER

Multiple R	.16786
R Square	.02818
Adjusted R Square	.01142
Standard Error	4.53144

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	69.06549	34.53275
Residual	116	2381.94057	20.53397

F = 1.68174 Signif F = .1906

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-2.263514	1.380641	-.150183	-1.639	.1038
LANGUAGE	-.782433	1.036086	-.069178	-.755	.4517
(Constant)	80.160070	1.969787		40.695	.0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Performance

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
PSSCORE	.204216	.204318	.972792	2.238	.0271
VERSCORE	.159189	.159199	.971942	1.729	.0864
SPATSCOR	.185559	.176760	.880432	1.926	.0566
COOPER	.132369	.133836	.992605	1.448	.1503
PHYSCON	-.062118	-.062605	.987110	-.673	.5025
INTCONT	.007748	.007837	.992786	.084	.9332
DOMN	-.025559	-.025926	.998308	-.278	.7814
DEPN	.063400	.063596	.977860	.683	.4957
ADJUST	.007097	.007123	.977536	.076	.9392
ACHIEV	-.032582	-.032793	.984422	-.352	.7256
SOCIAL	.161105	.157568	.929608	1.711	.0898
METHODIC	.054006	.054371	.985019	.584	.5604
OBJECTIV	-.058473	-.058469	.970127	-.628	.5312
DIRECTIV	.222145	.225163	.996948	2.478	.0147
INNOVATI	.163835	.165667	.992067	1.801	.0742

End Block Number 1 All requested variables entered.

* * * * MULTIPLE REGRESSION * * * *

Equation Number 1 Dependent Variable.. Training Performance

Block Number 2. Method: Enter PSSCORE VERSCORE SPATSCOR

Variable(s) Entered on Step Number
3.. PSSCORE problem solving score
4.. VERSCORE verbal score
5.. SPATSCOR spatial ability

Multiple R	.29702
R Square	.08822
Adjusted R Square	.04788
Standard Error	4.44711

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	5	216.23101	43.24620
Residual	113	2234.77505	19.77677

F = 2.18672 Signif F = .0605

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.194596	1.451235	-.079261	-.823	.4122
LANGUAGE	-.720522	1.032854	-.063704	-.698	.4869
PSSCORE	.187213	.150873	.128288	1.241	.2172
VERSCORE	.169711	.171356	.096389	.990	.3241
SPATSCOR	.205126	.175944	.120047	1.166	.2461
(Constant)	73.311836	3.214115		22.809	.0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Performance

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
COOPER	.118590	.123344	.754425	1.315	.1911
PHYSCON	-.067442	-.069725	.748865	-.740	.4610
INTCONT	-.007941	-.008205	.753043	-.087	.9310
DOMN	-.041820	-.042794	.727592	-.453	.6512
DEPN	.080857	.083130	.748463	.883	.3792
ADJUST	-.018015	-.018570	.753862	-.197	.8445
ACHIEV	-.039306	-.040710	.754276	-.431	.6672
SOCIAL	.217132	.214618	.736386	2.325	.0218
METHODIC	.160627	.155784	.733667	1.669	.0979
OBJECTIV	-.025777	-.024557	.715892	-.260	.7954
DIRECTIV	.203412	.209710	.751125	2.270	.0251
INNOVATI	.113470	.109569	.663880	1.167	.2459

End Block Number 2 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Peformance

Block Number 3. Method: Enter
COOPER PHYSCON INTCONT DOMN DEPN ADJUST ACHIEV

Variable(s) Entered on Step Number
6.. COOPER
7.. PHYSCON
8.. INTCONT
9.. DOMN
10.. DEPN
11.. ADJUST
12.. ACHIEV

Multiple R .33692
R Square .11351
Adjusted R Square .01316
Standard Error 4.52747

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	12	278.22391	23.18533
Residual	106	2172.78214	20.49794

F = 1.13110 Signif F = .3433

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.156279	1.561899	-.076718	-.740	.4608
LANGUAGE	-.847027	1.061176	-.074889	-.798	.4265
PSSCORE	.190629	.156605	.130629	1.217	.2262
VERSCORE	.173812	.180511	.098718	.963	.3378
SPATSCOR	.202287	.184290	.118385	1.098	.2748
COOPER	.195666	.159630	.129194	1.226	.2230
PHYSCON	-.051357	.164928	-.034745	-.311	.7561
INTCONT	-.030920	.200143	-.018157	-.154	.8775
DOMN	-.017557	.101611	-.019057	-.173	.8631
DEPN	.070211	.129005	.058799	.544	.5874
ADJUST	-.018326	.116702	-.018001	-.157	.8755
ACHIEV	-.047148	.120209	-.054618	-.392	.6957
(Constant)	71.560673	6.290956		11.375	.0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Performance

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
SOCIAL	.219958	.218989	.428024	2.300	.0234
METHODIC	.161900	.157089	.430487	1.630	.1061
OBJECTIV	-.037561	-.035429	.429839	-.363	.7171
DIRECTIV	.223535	.220764	.430928	2.319	.0223
INNOVATI	.120394	.116766	.431275	1.205	.2310

End Block Number 3 All requested variables entered.

* *

Block Number 4. Method: Enter
SOCIAL METHODIC OBJECTIV DIRECTIV INNOVATI

Variable(s) Entered on Step Number
13.. SOCIAL
14.. METHODIC
15.. OBJECTIV
16.. DIRECTIV
17.. INNOVATI

Multiple R	.43206
R Square	.18667
Adjusted R Square	.04978
Standard Error	4.44267

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	17	457.53467	26.91380
Residual	101	1993.47139	19.73734

F = 1.36360 Signif F = .1709

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Performance

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.296895	1.622983	-.086048	-.799	.4261
LANGUAGE	-1.091219	1.066241	-.096479	-1.023	.3086
PSSCORE	.261617	.159812	.179274	1.637	.1047
VERSCORE	.182394	.190885	.103592	.956	.3416
SPATSCOR	.256866	.206720	.150326	1.243	.2169
COOPER	.173797	.157589	.114754	1.103	.2727
PHYSCON	-.096325	.164116	-.065168	-.587	.5586
INTCONT	.009593	.200041	.005633	.048	.9618
DOMN	-3.12590E-04	.101390	-3.393E-04	-.003	.9975
DEPN	.046079	.128284	.038589	.359	.7202
ADJUST	-.051252	.119668	-.050344	-.428	.6694
ACHIEV	-.068284	.119113	-.079102	-.573	.5677
SOCIAL	.100546	.077075	.146524	1.305	.1950
METHODIC	.128526	.098226	.139320	1.308	.1937
OBJECTIV	-.028226	.058627	-.049781	-.481	.6312
DIRECTIV	.100545	.076805	.146700	1.309	.1935
INNOVATI	-.034305	.105276	-.038000	-.326	.7452
(Constant)	62.432192	7.801467		8.003	.0000

End Block Number 4 All requested variables entered.

Hierarchical Regression Analysis # 3
(Change in F statistics not presented)

**** MULTIPLE REGRESSION ****

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. Training Performance

Block Number 1. Method: Enter GENDER LANGUAGE

Variable(s) Entered on Step Number
1.. LANGUAGE
2.. GENDER

Multiple R	.21623
R Square	.04675
Adjusted R Square	.03314
Standard Error	4.35140

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	130.01832	65.00916
Residual	140	2650.85132	18.93465

F = 3.43334 Signif F = .0350

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-2.602414	1.124610	-.190998	-2.314	.0221
LANGUAGE	-1.051274	.893947	-.097064	-1.176	.2416
(Constant)	80.922285	1.680100		48.165	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
PSSCORE	.204788	.207913	.982561	2.506	.0134
VERSCORE	.164635	.167141	.982486	1.999	.0476
SPATSCOR	.179520	.176126	.917059	2.109	.0367
DIRECTIV	.217521	.221515	.988567	2.678	.0083
INNOVATI	.132049	.134829	.993814	1.604	.1109

End Block Number 1 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Performance

Block Number 2. Method: Enter PSSCORE VERSCORE SPATSCOR

Variable(s) Entered on Step Number
3.. PSSCORE problem solving score
4.. VERSCORE verbal score
5.. SPATSCOR spatial ability

Multiple R	.33085
R Square	.10946
Adjusted R Square	.07696
Standard Error	4.25164

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	5	304.39582	60.87916
Residual	137	2476.47383	18.07645

F = 3.36787 Signif F = .0067

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.841463	1.148944	-.135150	-1.603	.1113
LANGUAGE	-1.041521	.882956	-.096163	-1.180	.2402
PSSCORE	.190822	.127697	.134909	1.494	.1374
VERSCORE	.187218	.145844	.109092	1.284	.2014
SPATSCOR	.181504	.151704	.108759	1.196	.2336
(Constant)	74.472162	2.683176		27.755	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
DIRECTIV	.203710	.213949	.785753	2.554	.0117
INNOVATI	.089790	.090320	.720177	1.058	.2921

End Block Number 2 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. Training Performance

Block Number 3. Method: Enter DIRECTIV INNOVATI

Variable(s) Entered on Step Number
6.. DIRECTIV
7.. INNOVATI

Multiple R	.38811
R Square	.15063
Adjusted R Square	.10659
Standard Error	4.18284

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	7	418.88410	59.84059
Residual	135	2361.98555	17.49619

F = 3.42021 Signif F = .0021

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
GENDER	-1.737032	1.132420	-.127485	-1.534	.1274
LANGUAGE	-.848342	.875240	-.078327	-.969	.3341
PSSCORE	.195413	.125687	.138155	1.555	.1223
VERSCORE	.162858	.143806	.094897	1.132	.2594
SPATSCOR	.156943	.156332	.094042	1.004	.3172
DIRECTIV	.126779	.054613	.196653	2.321	.0218
INNOVATI	.019796	.077890	.022479	.254	.7998
(Constant)	69.193838	3.688524		18.759	.0000

End Block Number 3 All requested variables entered.

Appendix D

Logistic Regression Analyses

LOGISTIC REGRESSION ANALYSIS # 1

Total number of cases: 264 (Unweighted)
Number of selected cases: 264
Number of unselected cases: 0

Number of selected cases: 264
Number rejected because of missing data: 96
Number of cases included in the analysis: 168

Dependent Variable Encoding:

Original Value	Internal Value
.00	0 (Training Failure)
1.00	1 (Training Success)

Dependent Variable.. Training Success/Failure

Beginning Block Number 0. Initial Log Likelihood Function

-2 Log Likelihood 202.82212

* Constant is included in the model.

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number
1.. GENDER
LANGUAGE

Estimation terminated at iteration number 3 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood 200.492
Goodness of Fit 167.692

	Chi-Square	df	Significance
Model Chi-Square	2.330	2	.3120
Improvement	2.330	2	.3120

Classification Table for Training Success/Failure

		Predicted .00 (0)	Predicted 1.00 (1)	Percent Correct
Observed				
.00	0	0	49	.00%
1.00	1	0	119	100.00%
			Overall	70.83%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	.9939	.7854	1.6015	1	.2057	.0000	2.7017
LANGUAGE	-.2819	.4066	.4808	1	.4880	.0000	.7543
Constant	.1717	.9567	.0322	1	.8575		

Beginning Block Number 2. Method: Enter

Variable(s) Entered on Step Number
1.. VERSCORE verbal score
SPATSCOR spatial ability
PSSCORE problem solving score

Estimation terminated at iteration number 3 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	186.984
Goodness of Fit	169.657

	Chi-Square	df	Significance
Model Chi-Square	13.508	3	.0037
Improvement	13.508	3	.0037

Classification Table for Training Success/Failure

		Predicted .00 0	Predicted 1.00 1	Percent Correct
Observed .00	0	13	36	26.53%
1.00	1	8	111	93.28%
			Overall	73.81%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.4291	.8111	3.1047	1	.0781	.0742	4.1750
LANGUAGE	-.2584	.4382	.3476	1	.5555	.0000	.7723
VERSCORE	.0356	.0647	.3027	1	.5822	.0000	1.0362
SPATSCOR	.1340	.0658	4.1523	1	.0416	.1036	1.1434
PSSCORE	.1085	.0528	4.2304	1	.0397	.1055	1.1146
Constant	-2.9610	1.3352	4.9180	1	.0266		

Beginning Block Number 3. Method: Enter

Variable(s) Entered on Step Number
1.. ACHIEV
PHYSCON
INTCONT
DOMN
DEPN
COOPER
ADJUST

Estimation terminated at iteration number 4 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	166.939
Goodness of Fit	160.053

	Chi-Square	df	Significance
Model Chi-Square	20.045	7	.0055
Improvement	20.045	7	.0055

Classification Table for Training Success/Failure

		Predicted .00 0	Predicted 1.00 1	Percent Correct
Observed				
.00	0	17	32	34.69%
1.00	1	12	107	89.92%
			Overall	73.81%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.3611	.9331	2.1278	1	.1446	.0261	3.9006
LANGUAGE	-.3786	.4801	.6218	1	.4304	.0000	.6848
VERSCORE	.0211	.0687	.0946	1	.7584	.0000	1.0213
SPATSCOR	.1083	.0688	2.4751	1	.1157	.0504	1.1144
PSSCORE	.1157	.0570	4.1265	1	.0422	.1066	1.1227
ACHIEV	.0073	.0546	.0177	1	.8943	.0000	1.0073
PHYSCON	-.0952	.0785	1.4731	1	.2249	.0000	.9091
INTCONT	.0367	.0775	.2242	1	.6359	.0000	1.0374
DOMN	.1422	.0497	8.1950	1	.0042	.1820	1.1528
DEPN	.0873	.0549	2.5287	1	.1118	.0532	1.0913
COOPER	-.0626	.0743	.7096	1	.3996	.0000	.9393
ADJUST	.0377	.0524	.5192	1	.4712	.0000	1.0385
Constant	-8.5922	2.9888	8.2647	1	.0040		

Beginning Block Number 4. Method: Enter

Variable(s) Entered on Step Number
1.. METHODIC
OBJECTIV
INNOVATI
DIRECTIV
SOCIAL

Estimation terminated at iteration number 4 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	162.388
Goodness of Fit	172.788

	Chi-Square	df	Significance
Model Chi-Square	4.552	5	.4730
Improvement	4.552	5	.4730

Classification Table for Training Success/Failure

		Predicted .00 0	Predicted 1.00 1	Percent Correct
Observed				
.00	0	21	28	42.86%
1.00	1	12	107	89.92%
			Overall	76.19%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.3452	.9188	2.1438	1	.1431	.0293	3.8390
LANGUAGE	-.4078	.5009	.6630	1	.4155	.0000	.6651
VERSCORE	.0481	.0741	.4209	1	.5165	.0000	1.0492
SPATSCOR	.1203	.0743	2.6186	1	.1056	.0609	1.1278
PSSCORE	.1293	.0618	4.3775	1	.0364	.1193	1.1381
ACHIEV	-.0072	.0562	.0162	1	.8988	.0000	.9929
PHYSCON	-.0965	.0814	1.4031	1	.2362	.0000	.9080
INTCONT	.0325	.0798	.1657	1	.6840	.0000	1.0330
DOMN	.1438	.0513	7.8593	1	.0051	.1873	1.1546
DEPN	.0874	.0563	2.4084	1	.1207	.0495	1.0914
COOPER	-.0685	.0757	.8173	1	.3660	.0000	.9338
ADJUST	.0348	.0551	.3993	1	.5275	.0000	1.0354
METHODIC	.0757	.0480	2.4892	1	.1146	.0541	1.0786
OBJECTIV	.0048	.0264	.0331	1	.8556	.0000	1.0048
INNOVATI	-.0594	.0498	1.4205	1	.2333	.0000	.9424
DIRECTIV	.0456	.0352	1.6785	1	.1951	.0000	1.0466
SOCIAL	-.0125	.0396	.0992	1	.7528	.0000	.9876
Constant	-10.1753	3.5224	8.3448	1	.0039		

LOGISTIC REGRESSION ANALYSIS # 2

Total number of cases: 264 (Unweighted)
Number of selected cases: 264
Number of unselected cases: 0

Number of selected cases: 264
Number rejected because of missing data: 96
Number of cases included in the analysis: 168

Dependent Variable Encoding:

Original Value	Internal Value
.00	0 (Training Failures)
1.00	1 (Training Successes)

Dependent Variable.. Training Success/Failure

Beginning Block Number 0. Initial Log Likelihood Function

-2 Log Likelihood 202.82212

* Constant is included in the model.

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number
1.. GENDER
LANGUAGE

Estimation terminated at iteration number 3 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	200.492
Goodness of Fit	167.692

	Chi-Square	df	Significance
Model Chi-Square	2.330	2	.3120
Improvement	2.330	2	.3120

Classification Table for Training Success/Failure

		Predicted .00 (0)	Predicted 1.00 (1)	Percent Correct
Observed				
.00	0	0	49	.00%
1.00	1	0	119	100.00%
			Overall	70.83%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	.9939	.7854	1.6015	1	.2057	.0000	2.7017
LANGUAGE	-.2819	.4066	.4808	1	.4880	.0000	.7543
Constant	.1717	.9567	.0322	1	.8575		

Beginning Block Number 2. Method: Enter

Variable(s) Entered on Step Number
1.. CFATTOT

Estimation terminated at iteration number 3 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	188.278
Goodness of Fit	174.101

	Chi-Square	df	Significance
Model Chi-Square	12.214	1	.0005
Improvement	12.214	1	.0005

Classification Table for Training Success/Failure

		Predicted .00 (0)	Predicted 1.00 (1)	Percent Correct
Observed				
.00	0	10	39	20.41%
1.00	1	5	114	95.80%
			Overall	73.81%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.3974	.8090	2.9836	1	.0841	.0700	4.0446
LANGUAGE	-.3444	.4220	.6660	1	.4144	.0000	.7087
CFATTOT	.0944	.0281	11.2630	1	.0008	.2149	1.0990
Constant	-2.8361	1.3082	4.7001	1	.0302		

Beginning Block Number 3. Method: Enter

Variable(s) Entered on Step Number
1.. MPA
Estimation terminated at iteration number 4 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	178.189
Goodness of Fit	164.270

	Chi-Square	df	Significance
Model Chi-Square	10.089	1	.0015
Improvement	10.089	1	.0015

Classification Table for Training Success/Failure

		Predicted .00 (0)	Predicted 1.00 (1)	Percent Correct
Observed				
.00	0	13	36	26.53%
1.00	1	9	110	92.44%
			Overall	73.21%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.5919	.8750	3.3096	1	.0689	.0834	4.9131
LANGUAGE	-.3958	.4335	.8335	1	.3613	.0000	.6732
CFATTOT	.0915	.0289	10.0112	1	.0016	.2063	1.0958
MPA	.0316	.0105	8.9816	1	.0027	.1926	1.0321
Constant	-9.1875	2.6056	12.4333	1	.0004		

Beginning Block Number 4. Method: Enter

Variable(s) Entered on Step Number
1.. CWPI

Estimation terminated at iteration number 4 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	177.845
Goodness of Fit	165.996

	Chi-Square	df	Significance
Model Chi-Square	.345	1	.5571
Improvement	.345	1	.5571

Classification Table for Training Success/Failure

		Predicted .00 (0)	Predicted 1.00 (1)	Percent Correct
Observed .00	0	13	36	26.53%
1.00	1	9	110	92.44%
			Overall	73.21%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.5929	.8710	3.3443	1	.0674	.0869	4.9179
LANGUAGE	-.4313	.4385	.9675	1	.3253	.0000	.6496
CFATTOT	.0931	.0291	10.2706	1	.0014	.2154	1.0976
MPA	.0300	.0109	7.6011	1	.0058	.1773	1.0305
CWPI	.0059	.0101	.3457	1	.5565	.0000	1.0059
Constant	-9.9775	2.9532	11.4146	1	.000		

LOGISTIC REGRESSION # 3

Total number of cases: 264 (Unweighted)
Number of selected cases: 264
Number of unselected cases: 0

Number of selected cases: 264
Number rejected because of missing data: 91
Number of cases included in the analysis: 173

Dependent Variable Encoding:

Original Value	Internal Value
.00	0
1.00	1

Dependent Variable.. NOCRITER

Beginning Block Number 0. Initial Log Likelihood Function

-2 Log Likelihood 206.21067

* Constant is included in the model.

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number
1.. GENDER
LANGUAGE

Estimation terminated at iteration number 3 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	203.064
Goodness of Fit	172.470

	Chi-Square	df	Significance
Model Chi-Square	3.147	2	.2073
Improvement	3.147	2	.2073

Classification Table for NOCRITER

		Predicted .00 (0)	Predicted 1.00 (1)	Percent Correct
Observed .00	0	0	49	.00%
1.00	1	0	124	100.00%
			Overall	71.68%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.1136	.7769	2.0545	1	.1518	.0163	3.0453
LANGUAGE	-.3267	.4062	.6469	1	.4212	.0000	.7213
Constant	.1334	.9551	.0195	1	.8890		

Beginning Block Number 2. Method: Enter

Variable(s) Entered on Step Number
1.. DOMN
INTCONT
WORKO

Estimation terminated at iteration number 4 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood 184.803
Goodness of Fit 166.142

	Chi-Square	df	Significance
Model Chi-Square	18.261	3	.0004
Improvement	18.261	3	.0004

Classification Table for NOCRITER

		Predicted .00 0	Predicted 1.00 1	Percent Correct
Observed .00	0	11	38	22.45%
1.00	1	11	113	91.13%
			Overall	71.68%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.1808	.8605	1.8830	1	.1700	.0000	3.2571
LANGUAGE	-.4825	.4349	1.2310	1	.2672	.0000	.6172
DOMN	.1319	.0426	9.5850	1	.0020	.1933	1.1410
INTCONT	.0644	.0712	.8175	1	.3659	.0000	1.0665
WORKO	.0020	.0463	.0019	1	.9655	.0000	1.0020
Constant	-5.5865	2.2257	6.2999	1	.0121		

Beginning Block Number 3. Method: Enter

Variable(s) Entered on Step Number
1.. PSSCORE problem solving score
SPATSCOR spatial ability

Estimation terminated at iteration number 4 because
Log Likelihood decreased by less than .01 percent.

-2 Log Likelihood	175.579
Goodness of Fit	166.469

	Chi-Square	df	Significance
Model Chi-Square	9.224	2	.0099
Improvement	9.224	2	.0099

Classification Table for NOCRITER

		Predicted .00 0	Predicted 1.00 1	Percent Correct
Observed				
.00	0	15	34	30.61%
1.00	1	10	114	91.94%
			Overall	74.57%

---------- Variables in the Equation ----------

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
GENDER	1.5798	.9069	3.0346	1	.0815	.0748	4.8541
LANGUAGE	-.4491	.4512	.9907	1	.3196	.0000	.6382
DOMN	.1229	.0434	8.0223	1	.0046	.1805	1.1308
INTCONT	.0586	.0736	.6335	1	.4261	.0000	1.0603
WORKO	.0125	.0473	.0698	1	.7916	.0000	1.0126
PSSCORE	.1082	.0518	4.3672	1	.0366	.1132	1.1143
SPATSCOR	.1075	.0678	2.5126	1	.1129	.0527	1.1135
Constant	-8.0972	2.5452	10.1207	1	.0015		