Technical Report 1360

Validation of the Information/Communications Technology Literacy Test

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14. ABSTRACT *(Maximum 200 words)*:

The United States Army Research Institute for the Behavioral and Social Sciences, supported by the Human Resources Research Organization, conducted the current research effort to validate a measure of cyber aptitude, the Information/Communications Technology Literacy Test (ICTL), in predicting trainee performance in Information Systems Operator-Analyst (25B) and Nodal Network Systems Operator-Maintainer (25N) MOS. This report documents technical procedures and results of the research effort. Results suggest that the ICTL test has potential as a valid and highly efficient predictor of valued outcomes in Signal school MOS. Not only is the ICTL test a valid predictor of job knowledge and performance related criteria such as course grades, but is also a valid predictor of perceived MOS fit. ICTL scores are significantly related to final AIT course grades and perceptions of MOS fit in the 25N MOS. The ICTL test provides appreciable incremental validity beyond ASVAB-based predictors in the 25B MOS. Indices of fairness (e.g., sub-group differences and differential prediction) suggest that the ICTL test generally demonstrates evidence of smaller disparities that those observed in ASVAB-based predictors.

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VALIDATION OF THE INFORMATION/COMMUNICATIONS TECHNOLOGY LITERACY TEST

EXECUTIVE SUMMARY

The United States Army Cyber Center of Excellence (Cyber CoE)[1] asked the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to assist in the development of a methodology to improve the trainee selection process. Specifically, Cyber CoE requested information about adding a cyber-related aptitude test to the Armed Services Vocational Aptitude Battery (ASVAB). The joint service Information/Communication Technology Literacy (ICTL) test is a cognitive measure designed in the mold of an ASVAB technical subtest (i.e., Automotive and Shop Information, Electronics Information, General Science, Mechanical Comprehension). The ICTL test was designed to predict training performance in cyber-related occupations. Many Army Cyber MOS have comparable duties to Air Force cyber occupations and the Navy's Cryptologic Technician - Networks and Information Technologies occupations, for which the ICTL test has shown evidence of validity in predicting cyber-specific task or knowledge based performance outcomes such as course grades and academic training attrition (Russell & Sellman, 2010; Trippe & Russell, 2011).

The purpose of the research effort was to longitudinally validate a measure of cyber aptitude in predicting trainee performance in Information Systems Operator-Analyst (25B) and Nodal Network Systems Operator-Maintainer (25N) MOS. This report documents technical procedures and results of the research effort.

The ICTL test was administered during the first week of training in the Information Systems Operator-Analyst (25B) (n =1,805) and Nodal Network Systems Operator-Maintainer (25N) (n = 314) MOS as part of this research effort. As Soldiers neared the end of training in the focal MOS, they were administered a battery of criterion assessments comprising a general job knowledge test, a survey of attitudes and experiences, peer ratings of MOS-specific performance dimensions, Warrior Tasks and Battle Drills job knowledge test (WTBD JKT), and the Army Life Questionnaire (ALQ).

A number of statistically significant relationships were observed between the ICTL and important outcomes metrics for the 25B MOS. ICTL scores were significantly related to peer ratings of MOS specific job performance; those with higher ICTL scores have higher peer-rated MOS-specific job performance ratings. The indication is that the ICTL test is effective in discriminating between low and high performers in Advanced Individual Training (AIT). ICTL scores were also significantly related to final AIT course grades, which corroborates the former finding. ICTL scores were significantly related to a Soldier's likelihood of graduating AIT without an academic failure. That is, those with higher ICTL scores are more likely to graduate AIT without an academic failure than those with lower ICTL scores. ICTL scores were positively related to perceptions of MOS fit, indicating that the ICTL might function as an

[1] At the time of this work was the Signal Center of Excellence. The Signal Center of Excellence transitioned to the Cyber Center of Excellence in March 2014.

indicator of interest and motivation. ICTL scores were significantly related to final AIT course grades and perceptions of MOS fit in the 25N MOS.

The ICTL test provides appreciable incremental validity beyond the AFQT when predicting the two most job specific criteria (i.e., Army Initial Training [AIT] grades and peer performance ratings scale [PRS]) in both MOS. ICTL scores also provide appreciable incremental validity beyond aptitude area composites when predicting AIT grades and PRS criteria. ICTL scores provide substantial incremental validity beyond the Electronics Information (EI) test in predicting all criteria (Warrior Tasks and Battle Drills job knowledge test, Final AIT course Grade, and Graduate AIT without Failure) except the Performance Rating Scales means in 25N. ICTL scores provide appreciable incremental validity in predicting perceptions of MOS fit in the 25B MOS as well. Indices of fairness (e.g., sub-group differences and differential prediction) suggest than the ICTL test generally demonstrates evidence of smaller disparities that those observed in ASVAB-based predictors.

Results suggest that the ICTL test has potential as a valid and highly efficient predictor of valued outcomes in Cyber MOS. Not only is the ICTL test a valid predictor of job knowledge and performance related criteria such as course grades, but is also a valid predictor of perceived MOS fit. This finding lends support to the notion of the ICTL test functioning as an indirect measure of interest, intrinsic motivation, and skill in a particular area. Just as the Automotive and Shop (AS) test can be thought of as a way to identify hobbyists who like to work on cars or motorcycles and are therefore more likely to perceive better fit in automotive related MOS, the ICTL is likely operating at some level to capture variance related to applicants in the information technology (IT) domain who like to do things like build computers and configure elaborate home networks.

What is perhaps most notable about the pattern of validity and incremental validity results is the ICTL test's efficiency of prediction in these Signal MOS. In general, the ICTL test predicts performance just as well as composites derived from multiple ASVAB tests. Moreover, the ICTL test explains additional variance beyond these composites in almost every criterion measure. Validity of the ICTL test is substantially greater than its closest counterpart in the ASVAB, the EI test, in predicting performance in these particular MOS. Thus it represents a useful supplement to ASVAB for cyber occupations.

VALIDATION OF THE INFORMATION/COMMUNICATIONS TECHNOLOGY LITERACY TEST

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Introduction

The Unites States Army Cyber Center of Excellence (Cyber CoE) asked the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to assist in the development of a selection tool to improve the trainee selection process. Specifically, Cyber CoE requested information about adding a cyber specific aptitude test to compliment the Armed Services Vocational Aptitude Battery (ASVAB).[2]

The Information/Communication Technology Literacy (ICTL) test is a cognitive measure designed in the mold of an ASVAB technical subtest. The ICTL test was developed and validated by the Air Force, with all the Services contributing, to predict training performance in cyber-related occupations. Many Army Signal MOS have comparable duties to Air Force cyber occupations. For the Navy's Cryptologic Technician - Networks (CTN) and Information Technologies (IT) occupations, the ICTL test has shown evidence of validity in predicting cyber-specific task or knowledge based performance outcomes such as course grades and academic training attrition (Russell & Sellman, 2010; Trippe & Russell, 2011).

The ICTL test may also function well as an indirect indicator of MOS fit or motivation-based performance outcomes. Similar to ASVAB technical subtests, the ICTL measure is an information test. Information tests were among the most successful and most highly valid classification tests created by the Army Air Force's (AAF) Aviation Psychology Program during World War II. Guilford and Lacey (1947) described the logic of information tests as follows:

> It is becoming recognized more and more that what a person knows or does not know can be used to reveal a number of things concerning his personal background. Since he is to a large extent a product of his personal experience, and since what he is bodes good or ill concerning his future status in one respect or another, knowledge scores promise to have predictive value (p. 341).

The key notion is that information tests are thought to be indirect measures of interest, intrinsic motivation, and skill in a particular area. Although the ICTL test is a cognitive measure, it is likely to have the strongest relationship with cyber-specific tasks or knowledge-based performance outcomes such as course grades. As such, it is reasonable to hypothesize that the ICTL will correlate with attitudes related to occupational fit.

The purpose of the research effort was to longitudinally validate a measure of cyber aptitude in predicting trainee performance in Information Systems Operator-Analyst (25B) and Nodal Network Systems Operator-Maintainer (25N) MOS. We summarize the adaptation and development of criterion measures and present results of psychometric and predictive validity analyses.

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[2] ASVAB tests/composites include: Arithmetic Reasoning (AR), Assembling Objects (AO), Auto & Shop Information (AS), Electronics Information (EI), General Science (GS), Math Knowledge (MK), Mechanical Comprehension (MC), Paragraph Comprehension (PC), and Word Knowledge (WK).

Background on Development of the ICTL Test

In 2005-2006, the Department of Defense (DoD) convened a panel of experts in the areas of personnel selection, job classification, psychometrics, and cognitive psychology to provide recommendations for improving the Armed Services Vocational Aptitude Battery (ASVAB). The panel made 22 recommendations regarding test content specifications, administration, validation procedures, and new test content areas. One of the review panel's recommendations stated that "research should be conducted to develop and evaluate a test of information and communications technology literacy. The efficacy of coaching and item familiarity, as well as the feasibility of creating multiple forms, should be examined in conjunction with test development" (Drasgow, Embretson, Kyllonen, & Schmidt, 2006, p. 26).

Toward that end, the U.S. Air Force assumed responsibility as the lead organization in development of an ICTL test which could potentially be added to the ASVAB. The first phase of the research, to develop and pilot test an ICTL measure, was conducted in FY 2008. The specific objectives were to (a) prepare a content blueprint indicating what the test should measure, (b) develop and pilot a draft version of the test, (c) assemble new test forms, and (d) plan validation research. The test had three components: (a) background information, or biodata, (b) information-communications technology knowledge, and (c) logic. Based on the results of the pilot test, pre-equated alternate forms of the ICTL were developed.

The purpose of Phase II was to assess the validity of the ICTL measure for predicting success in technical training. Seven Air Force technical training schools (e.g., Communications, Network, Switch & Crypto Systems) and two Navy "A" schools[3] (i.e., Information Systems Technician and Cryptologic Technician [Networks]) participated in the project. All but two of the occupations included were cyber occupations. Non-cyber occupations provided an opportunity to evaluate discriminant validity. A predictor battery including the ICTL test, a biodata measure, and a figural reasoning test (a measure of nonverbal reasoning) was administered to students at the beginning of class. Final school grades (FSGs) were collected to serve as criteria for validating the measures. In total, 1,396 students had complete predictor data and FSGs. The ICTL measure predicted FSGs significantly for all but one of the cyber occupations. It was a significant predictor in one of the non-cyber occupations (Security Forces) as well. Analyses also suggested that the ICTL was a better predictor than Electronics Information (EI), one of the ASVAB subtests currently included in composites used to select military applicants for many of the cyber occupations (Russell & Sellman, 2010). Phase II indicated that additional further research was warranted.

The primary objectives of Phase III were to assess functioning of the test in an applicant population and to develop operational test forms. One of four 40-item experimental forms was administered to 52,708 military service applicants at Military Entrance Processing Station (MEPS) in a randomly equivalent groups common item design. Once analyses of the MEPS forms were complete, two 29-item operational forms were created. The forms are equivalent with respect to content balance, difficulty, discrimination and reliability (Trippe & Russell,

[3] The Navy calls its job training "A" school. All Navy enlisted ratings (jobs) have an A school, which teaches the fundamentals of the specific Navy job.

2011). Analyses of the operational test form scores showed that the ICTL test exhibits smaller subgroup[4] differences than the ASVAB technical knowledge tests.

A second objective of Phase III was to determine how well the ICTL test predicts success in technical training for the Navy's Cryptologic Technician (Networks), or CTN, school. Phase II data showed that the ICTL test scores significantly predicted performance in CTN school; however, near the conclusion of that study, the Navy altered the CTN course format. Phase III data collected at the CTN school (*n* = 118) for about a year showed that the ICTL test was a significant predictor of both grade point average and graduation status (i.e., graduated vs. did not graduate) in the new course format. The ICTL test also provided significant incremental validity over CTN school selection composites (Trippe & Russell, 2011).

Method

ICTL Administration at Cyber CoE School

The current operational forms of the ICTL test were administered via computer during the first week of advanced individual training (AIT) in the Information Systems Operator-Analyst (25B) and Nodal Network Systems Operator-Maintainer (25N) MOS as part of this research effort (25B *n* =1,805; 25N *n* = 314). One of two parallel 29-item forms was randomly assigned to each Soldier. Five groups were examined: males (25B *n* = 1,371; 25N *n* = 254), females (25B *n* = 359; 25N *n* = 39), non-Hispanic Blacks (25B *n* = 522; 25N *n* = 62), non-Hispanic Whites (25B *n* = 803; 25N *n* = 164), and Hispanic Whites (25B *n* = 247; 25N *n* = 37). Table 1 presents ICTL test scores by MOS in both the scaled reporting and percent correct metric. The scaled scores are an Item Response Theory-based maximum a posteriori (MAP) ability estimate that has been placed on an adjusted t-score scale. MAP estimation, Bayes modal estimation, considers the examinee's pattern of item responses in relation to a set of item parameters that characterize the difficulty, discrimination and guessing potential of each item as well as an assumed distribution of ability (Embretson & Reise, 2000). MAP ability estimates were computed using the commercial software MULTILOG (Thissen, 2003). A standard t-score distribution has a mean of 50 and standard deviation of 10. The ICTL reporting metric has been adjusted such that the standard distribution would be expected in the youth population (Profile of American Youth [PAY97] sample; DMDC, 2003). Scaled ICTL scores are used in the validation analyses reported below to reflect the use of scaled scores in operational decision making. Scores were not assigned to Soldiers who omitted more than five test items or completed the assessment in less than three minutes.

[4]Subgroup comparisons were male vs. female, non-Hispanic White vs. non-Hispanic Black and non-Hispanic White vs. Hispanic White. These groups were chosen to be consistent with designations used by the ASVAB testing program (Defense Manpower Data Center, 2011)

Table 1
Summary of ICTL Scores by MOS

Score	25B (*n* =1,805)				25N (*n* = 314)			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max
ICTL Scaled Score	55.3	8.1	27	79	59.9	7.7	35.0	79.0
ICTL % Correct	58.6	14.9	17.2	100	66.7	14.0	31.0	100

Criterion Measure Adaptation and Development

As Soldiers neared the end of training in the focal MOS, they were administered via computer a battery of criterion assessments comprising a general job knowledge test, a survey of attitudes and experiences, and peer ratings of MOS-specific performance dimensions. Each criterion measure is described in more detail below.

Job Knowledge Test (JKT).

The Warrior Tasks and Battle Drills job knowledge test (WTBD JKT) was administered to all Soldiers participating in this research effort. The WTBD JKT measures knowledge that is general to all enlisted Soldiers and includes a mix of item formats (e.g., multiple-choice and multiple-response). The items use visual images to make them more realistic and reduce reading requirements for the test. The WTBD JKT was developed as part of a separate research project (Knapp & Heffner, 2010). Prior to finalizing the items, in the summer of 2011, for use in that project, the items were reviewed by project staff and Army subject matter experts (SMEs) to ensure they were of high quality. Poorly performing or outdated items were replaced, and additional items were included to ensure adequate coverage of content areas identified in the test blueprints that had been established for the test.

JKT scores were flagged as invalid if the Soldier (a) omitted more than 10% of the assessment items, (b) took fewer than 5 minutes to complete the entire assessment, or (c) selected an implausible response to one of the embedded careless responding items. Table 2 contains a summary of the valid WTBD JKT scores by MOS. Cronbach's coefficient alpha, which is an internal consistency index of reliability, is .72 in the combined MOS sample.

Table 2
Summary of JKT Scores by MOS

Score	25B (*n* =959)				25N (*n* = 146)			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max
WTBD % Correct	61.3	11.8	13.5	94.6	66.0	10.3	29.7	86.5

Army Life Questionnaire (ALQ).

The ALQ was designed to measure Soldiers' self-reported attitudes and experiences in the Army. The ALQ includes scales that cover (a) Soldiers' commitment and retention-related attitudes and (b) Soldiers' performance and adjustment. Each ALQ scale is scored differently depending on the nature of the attribute being measured. The Army Physical Fitness Test (APFT) score is a write-in item. Training Achievements, Training Failures and Disciplinary Incidents are simply a sum of the "yes" responses. The remaining scales (see Table 3) are scored with Likert-type scales by computing a mean of the constituent item scores after accounting for reverse coded items.

Table 3
ALQ Likert-Type Scales

Scale Name	Description	Number of Items	Example Item	Likert Scale Anchors
Affective Commitment	Measures Soldiers' emotional attachment to the Army.	7	I feel like I am part of the Army 'family.'	1 (strongly disagree) to 5 (strongly agree)
Normative Commitment	Measures Soldiers' feelings of obligation toward staying in the Army until the end of their current term of service.	5	I would feel guilty if I left the Army before the end of my current term of service.	1 (strongly disagree) to 5 (strongly agree)
Career Intentions	Measures Soldiers' intentions to reenlist and to make the Army a career.	3	How likely is it that you will make the Army a career?	Varies by item: 1 (strongly disagree) to 5 (strongly agree); 1 (not at all confident) to 5 (extremely confident); 1 (extremely unlikely to 5 (extremely likely)
Reenlistment Intentions	Measures Soldiers' intention to reenlist in the Army.	4	I intend to leave the Army after completing my current term of service.	1 (strongly disagree) to 5 (strongly agree)
Attrition Cognitions	Measures the degree to which Soldiers think about attriting before the end of their first term.	4	I am confident that I will complete my current term of service.	Varies by item: 1 (strongly disagree) to 5 (strongly agree); 1 (never) to 5 (very often)
Army Life Adjustment	Measures Soldiers' transition from civilian to Army life.	9	Looking back, I was not prepared for the challenges of training in the Army.	1 (strongly disagree) to 5 (strongly agree)
Army Civilian Comparison	Measures Soldiers' impressions of how Army life compares to civilian life.	6	Indicate how you believe conditions in the Army compare to conditions in a civilian job with regards to pay and other factors (e.g., advancement opportunities, job security).	1 (much better in the Army) to 5 (much better in civilian life)
MOS Fit	Measures Soldiers' perceived fit with their MOS.	9	My MOS provides the right amount of challenge for me.	1 (strongly disagree) to 5 (strongly agree)
Army Fit	Measures Soldiers' perceived fit with the Army.	8	The Army is a good match for me.	1 (strongly disagree) to 5 (strongly agree)

As with the JKT, ALQ data were flagged as unusable if the Soldier (a) omitted more than 10% of the assessment items, (b) took fewer than 5 minutes to complete the entire assessment, or (c) chose an implausible response to the embedded careless responding item. Table 4 contains a summary of potentially relevant ALQ scales scores (i.e., those scales the ICTL test might reasonably be hypothesized to predict) by MOS. A summary of the distributions of all ALQ scale scores as well as their relationship with predictor variables can be found in Table A3 of the Appendix.

Table 4
Summary of Relevant ALQ Scale Scores by MOS

ALQ Scale	25B (*n* =1012)					25N (*n* = 153)			
	α	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max
Army Fit	.86	4.0	0.6	1.0	5.0	3.9	0.6	2.1	5.0
Attrition Cognitions	.75	1.6	0.6	1.0	4.0	1.7	0.7	1.0	4.8
Career Intentions	.91	3.1	1.1	1.0	5.0	2.9	1.0	1.0	5.0
MOS Fit	.93	3.9	0.8	1.1	5.0	3.6	0.8	1.1	5.0
Reenlistment Intentions	.81	3.4	0.9	1.0	5.0	3.3	0.9	1.0	5.0
Training Achievements	--	0.3	0.5	0.0	2.0	0.2	0.4	0.0	1.0
Training Failures	--	0.5	0.7	0.0	3.0	0.5	0.7	0.0	3.0

The ALQ conceptual measurement model was evaluated in a confirmatory factor analysis (CFA) framework. CFA is a component of a larger paradigm of analyses commonly known as covariance structure analysis or structural equation modeling (see Bollen, 1989). CFA allows the user to specify an *a priori* measurement model (by constraining parameters of the model), in which the relationship between observed (i.e., survey items) and latent (i.e., constructs) variables is hypothesized. The covariance matrix implied by the hypothesized model is evaluated against the observed data matrix, thereby allowing quantification of model fit.

Three measurement models were tested:

- A one-factor model in which all ALQ items are explained by a general factor.
- A four-factor model in which Army Fit, Attrition Cognitions and MOS fit items are all explained by their respective latent constructs and the Career Intentions and Reenlistment Intentions items are collapsed and explained by a fourth factor.
- A five-factor model in which Army Fit, Attrition Cognitions, MOS fit, Career Intentions and Reenlistment Intentions items are all explained by their respective latent constructs.

Model fit indices for the three ALQ models are reported in Table 5. The associated chi-square values with all models are not statistically significant; this indicates a poor model fit. Nevertheless, the chi-square test is not generally relied on as an index of overall model fit in models tested on samples larger than 200 (Kenny, 2009). Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values above .95 are generally indicative of good model fit (higher is better). Root Mean Residual (RMR) values below .05 and Root Mean Square Error of Approximation (RMSEA) values below .08 are generally indicative of good model fit (lower is better; Kenny, 2009). Fit index values in Table 5 suggest that the single-factor model exhibits very poor fit and both the four- and five-factor models fit the data moderately well. Because the models are nested, it is possible to make direct statistical comparisons using the difference between chi-square values. The five-factor model fits the data significantly better (at the .01 level) than the four-factor model, but the CFI, RMSEA, and SRMR values are nearly identical between the four- and five- factor models.

Table 5
CFA Model Fit Indices for the ALQ

Index	One Factor	Four Factor	Five Factor
Chi-Square	12329.924	2555.869	2533.767
DF	350	344	340
CFI	.459	.900	.901
TLI	.416	.890	.890
SRMR	.169	.057	.057
RMSEA	.166	.072	.072
Δ Chi-square	--	9774.055	22.102
Δ *DF*	--	6	4

Performance Rating Scales (PRS).

Peer performance rating scales (PRS) were developed through workshops with AIT instructors from each MOS. The first workshops, conducted in person, identified performance dimensions suitable for the training scales and obtained behavioral descriptions of performance within each dimension. Subsequently, SMEs also reviewed the products of the workshops. The primary means for this review was a retranslation exercise, which asked the SMEs to sort the behavioral examples into the dimensions. The post exercise discussion provided a systematic way to evaluate the quality and completeness of the behavioral examples. Based on feedback from the SMEs, the dimensions and behavioral examples were further modified and developed into draft training PRS in preparation for the next SME meeting.

The next SME workshop, conducted via teleconference, involved the SMEs thinking of two Soldiers they had in training recently and rating these Soldiers on the draft PRS. The “try-out” discussion led to some minor wording changes and confirmed the instructions were clear and, for the most part, Soldiers had ample opportunity to observe the behaviors depicted in the scales. The final PRS include a “Not applicable” or “Not observed” response option for each scale. The final peer PRS can be found in Appendix Tables A1 and A2. The 25B PRS comprise 6 scales and the 25N comprise 8 scales.

Peer rating assignments were made according to a protocol administered by course instructors. According to the protocol, Soldiers are divided randomly into groups of a minimum size of four within each training course. Each Soldier has the opportunity to rate at least three of his or her randomly assigned peers on each of the MOS-specific dimensions. The PRS assessment also includes a 4-point “familiarity” rating in which the rater indicates his or her general opportunity to observe each Soldier being rated (i.e., “not enough” through “enough to judge most aspects of performance”). Based on their familiarity rating, each Soldier may then rate all three or none of their peers assigned to them. Soldiers in 25B and 25N MOS were rated by an average of 2.7 and 2.9 raters, respectively. An aggregate peer rating is computed for each Soldier as the average of all peer ratings where familiarity was rated as sufficient to judge at least “some aspects” of the ratee’s performance. Table 6 contains summary statistics for the peer PRS by MOS. Cronbach’s alpha, an index of internal consistency reliability, is .96 across all scales for both 25B and 25N PRS. Interrater reliability (IRR) estimates range from .27 to .60.

Table 6
Summary of Relevant Peer PRS by MOS

PRS Scale	25B (*n* =1,076 ratees)					25N (*n* = 169 ratees)			
	IRR	*M*	*SD*	Min	Max	*M*	*SD*	Min	Max
Implement Network	.56	3.9	0.9	1.0	5.0	--	--	--	--
Hardware Concepts	.50	4.0	0.9	1.0	5.0	--	--	--	--
Software Applications	.43	4.1	0.8	1.0	5.0	--	--	--	--
Network Security	.43	3.9	0.9	1.0	5.0	--	--	--	--
Troubleshooting*	.44	3.9	0.9	1.0	5.0	--	--	--	--
Safety Procedures*	.27	4.1	0.8	1.0	5.0	--	--	--	--
Configure Devices	.60	--	--	--	--	3.9	0.8	1.0	5.0
Troubleshooting*	.58	--	--	--	--	3.9	0.7	1.0	5.0
COMSEC	.41	--	--	--	--	4.0	0.6	1.3	5.0
Network Architecture	.57	--	--	--	--	4.1	0.7	1.0	5.0
Device Access	.48	--	--	--	--	4.1	0.7	1.0	5.0
Access Method	.43	--	--	--	--	4.1	0.6	1.0	5.0
Internet Security	.43	--	--	--	--	4.0	0.7	1.3	5.0
Safety Procedures*	.35	--	--	--	--	4.2	0.6	1.7	5.0
Peer Rating Mean	.53|.59	4.0	.78	1.0	5.0	4.0	.63	1.2	5.0

IRR = Interrater reliability. Interrater reliability was assessed using $G(q,k)$, a reliability metric designed specifically for studies where the measurement design is ill-structured (Putka, Le, McCloy, & Diaz, 2008).
*Note that Troubleshooting and Safety dimensions are defined differently according to the demands of each MOS and are therefore reported separately.

Table 7 contains CFA model fit indices for a general (single) factor PRS model tested in each MOS. Model fit indices suggest that the data fit a general factor model very well in the 25B MOS and fit is good in the 25N MOS. Given the high degree of internal correspondence suggested by both the Cronbach's alpha (i.e., >.95) and CFA, only the overall PRS mean will be analyzed in predictive analyses described later in this report.

Table 7
CFA Model Fit Indices for a General Factor in the PRS

Index	25B	25N
Chi-Square	17.211*	67.991**
DF	9	20
CFI	.993	.966
TLI	.988	.952
SRMR	.011	.026
RMSEA	.073	.119

$^{*}p<.05$
$^{**}p<.01$

Administrative Data.

ASVAB standard scores were extracted from the Military Entrance Processing Command (MEPCOM) Integrated Resource System (MIRS) database. Table 8 contains summary statistics on relevant ASVAB scores by MOS. The Armed Forces Qualification Test (AFQT) is included because it is a good indicator of general mental aptitude and used for selection into the Services. The

Electronics Information (EI) test is included because it is the closest counterpart to the ICTL test in the extant ASVAB battery. The Electrical (EL), Skilled Technical (ST) and Surveillance and Communications (SC) aptitude area composites are included because they are currently used for Signal MOS qualification.

Table 8
Summary of ASVAB Scores by MOS

ASVAB	25B (*n* =1,746)				25N (*n* = 294)			
	M	*SD*	Min	Max	*M*	*SD*	Min	Max
AFQT Percentile	63.6	16.5	21.0	99.0	74.7	12.9	40.0	99.0
Electronics Information (EI)	52.0	8.5	23.0	82.0	56.6	7.1	38.0	79.0
Electrical Comp (EL)*	106.8	11.4	83.0	156.0	115.0	8.8	97.0	144.0
Skilled Tech Comp (ST)*	107.6	10.8	85.0	155.0	115.5	8.6	98.0	144.0
Surv. & Comm. Comp (SC)*	107.8	11.0	85.0	155.0	115.8	8.6	98.0	144.0

*Aptitude area composites are weighted combinations of the following ASVAB tests and composites: Arithmetic Reasoning, Auto & Shop, Electronics Information, General Science, Mechanical Comprehension, and Verbal.

Data on Initial Military Training (IMT) school performance and completion were extracted from (a) Army Training Requirements and Resources System (ATRRS) database produced by the Training and Doctrine Command (TRADOC) and (b) Army Training Support Center's (ATSC) Resident Individual Training Management System (RITMS) data files. ATRRS course information was used to determine if Soldiers graduated from AIT with or without at least one academic failure. Soldiers' final AIT course grades were extracted from RITMS. Table 9 contains a summary of these administrative criterion variables. The average final course grade (reported in a percent correct metric) is 81.8 and 92.4 for 25B and 25N, respectively. Eighty six percent of 25B Soldiers in the available sample graduated AIT without an academic failure and 90% of 25N Soldiers in the available sample graduated AIT without a failure.

Table 9
Summary of Administrative Criteria

Admin Criterion	25B					25N				
	n	*M*	*SD*	Min	Max	*n*	*M*	*SD*	Min	Max
Final AIT Course Grade	524	81.8	9.6	35.0	100	159	92.4	5.0	77.4	100
Grad AIT w/o Failure	1,435	0.86	0.35	0	1	228	0.91	0.29	0	1

Results

ICTL Score Relationships with Criterion Measures

Table 10 presents bivariate correlations between the ICTL scaled scores and potentially relevant criterion measures. Full observed correlation matrices can be found in Tables A4 and A5. Table 10 also contains bivariate correlations corrected for multivariate range restriction on the ASVAB subtests (Lawley, 1943) using a large sample (n = 483,737) of Army applicants as the unrestricted reference (see Knapp & LaPort, 2014 for details of the sample). Statistical corrections for range restriction in the predictor domain are applicable in this context because Soldiers in these MOS have already been selected through multiple hurdles, which tend to underestimate the relationship between predictors and criteria in the unrestricted population.

A number of statistically significant relationships are observed in the 25B MOS.[5] ICTL scores are positively related to perceptions of MOS fit, which is consistent with the notion of the ICTL functioning as an indicator of interest and motivation. ICTL scores are negatively related to career and reenlistment intentions scales, suggesting that more knowledgeable Soldiers are less likely to consider the Army as a career or to reenlist. It should be noted that such perceptions have been measured at a fairly early stage and Soldiers' attitudes at this point are less predictive of their actual behavior than attitudes captured at a point more proximal to their behavior. That is, Soldiers are expressing attitudes about behaviors or decisions that will be made many months or years in the future and current attitudes are often weakly related to actual behaviors in the distant future. ICTL scores are significantly related to WTBD JKT scores. This relationship is likely accounted for by the cognitive load of both measures. That is, both the ICTL test and the JKT are to some extent indicators of general mental aptitude, and those with greater aptitude acquire more knowledge in both domains. ICTL scores are significantly related to the overall PRS mean, indicating that the ICTL test is effective in discriminating between low and high performers (as judged by peers) in AIT. ICTL scores also are significantly related to final AIT course grades, which corroborates the former finding. Finally, ICTL scores are significantly related to a Soldier's status of graduating AIT without an academic failure. That is, those with higher ICTL scores are more likely to graduate AIT without an academic failure than those with lower ICTL scores.

ICTL scores are significantly related to perceptions of MOS fit and reenlistment intentions in the 25N MOS as well. The directionality of these relationships is the same as those observed in the 25B MOS, with ICTL scores positively related to MOS fit and negatively related to reenlistment intentions. While the sample is markedly smaller, ICTL scores are also significantly related to WTBD JKT scores and final AIT course grades in the 25N MOS.

Table 10
Bivariate Correlations between ICTL and Relevant Criteria

	25B				25N			
Criterion Measure	*n*	*r*	*p*	ρ*	*n*	*r*	*p*	ρ*
Fit and Retention								
Army Fit	1,000	-.015	.629	-.038	152	-.063	.438	-.158
Attrition Cognitions	1,000	.014	.665	.011	152	.156	.056	.200
Career Intentions	1,000	**-.176**	**<.001**	-.248	152	-.114	.161	-.238
MOS Fit	1,000	**.291**	**<.001**	.340	152	**.160**	**.049**	.137
Reenlistment Intentions	1,000	**-.151**	**<.001**	-.216	152	**-.186**	**.021**	-.274
End of Training Job Knowledge/Performance								
WTBD % Correct	949	**.357**	**<.001**	.480	145	**.177**	**.033**	.290
PRS Mean	1,080	**.327**	**<.001**	.412	168	.145	.061	.166
Final AIT Course Grade	524	**.405**	**<.001**	.492	159	**.459**	**<.001**	.624
Grad AIT w/o Failure	1,435	**.158**	**<.001**	.215	228	.080	.228	.156

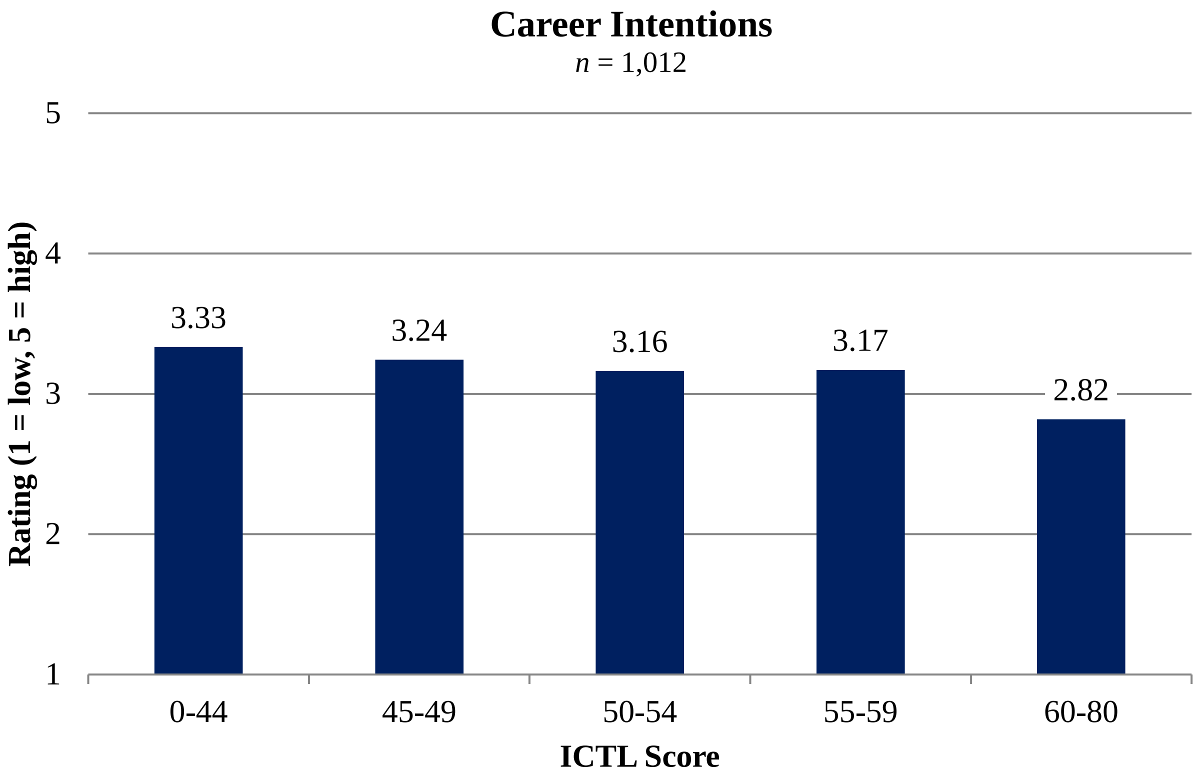
* ρ indicates coefficients corrected for multivariate range restriction on the ASVAB (Lawley, 1943).
Bold values are statistically significant at the .01 level. Italicized values are significant at the .05 level.

[5] Note that values corrected for multivariate range restriction are population values to which tests of statistical significance do not apply.

Although correlation coefficients are standard practice for documenting statistical evidence of predictive validity, interpretation is often fairly abstract with respect to practical implications. The histograms in Figures 1-6 present the statistically significant relationships observed in Table 10 in an expectancy chart.

To create the histograms seen in Figures 1-6, Soldiers in each MOS were first divided into one of five quintiles based on their standing on the ICTL test with respect to the applicant population. That is, the first quintile represents Soldiers in the bottom 20% of the ICTL score distribution in the applicant population, the second quintile represents Soldiers with scores falling between 21% and 40% of the ICTL score distribution in the applicant population, and so on up to the 5th quintile that represents the top 20% of the ICTL distribution in the applicant population. Cut scores for the ICTL quintiles were derived using a separate, relatively large sample (*n* =22,829) of Army applicants administered at Military Entrance Processing Stations (MEPS). To be clear, quintiles were not derived by dividing distribution of ICTL scores in the current sample of 25B and 25N Soldiers into five rank ordered groups (0-44, 45-49, 50-54, 55-59, and 60-79). The current analysis sample of 25B and 25N Soldiers is made up of Soldiers who have already passed a number of selection hurdles (e.g., they have accessed into the Army and qualified for a selective MOS) and are therefore not representative of the distribution of ICTL scores in the applicant population from which the Army is interested in selecting from. Using an applicant sample to derive cut scores for the ICTL quintiles is more faithful to the selection model this research is ultimately informing. One drawback of the approach to using applicant derived quintile cuts is that the five groups of 25B and 25N Soldiers are not evenly distributed. In the most extreme example, there do not happen to be any 25N Soldiers with WTBD JKT scores in the bottom 20% of the applicant referenced ICTL distribution (see Figure 6).

One of the more illustrative relationships in Figures 1-6 includes the finding that 25B Soldiers in the top two quintiles have a rate of graduation from AIT without a failure of 90%, compared to a rate of 70% for those in the bottom quintile (see Figure 4). Similarly, 25B Soldiers in the top quintile have an average AIT final course grade of 86% compared to 74% for those in the bottom quintile (see Figure 4). Expectancy charts are less dramatic in the 25N MOS because most of those Soldiers (75%) are in the top two applicant referenced quintiles, and the available sample size is relatively small.



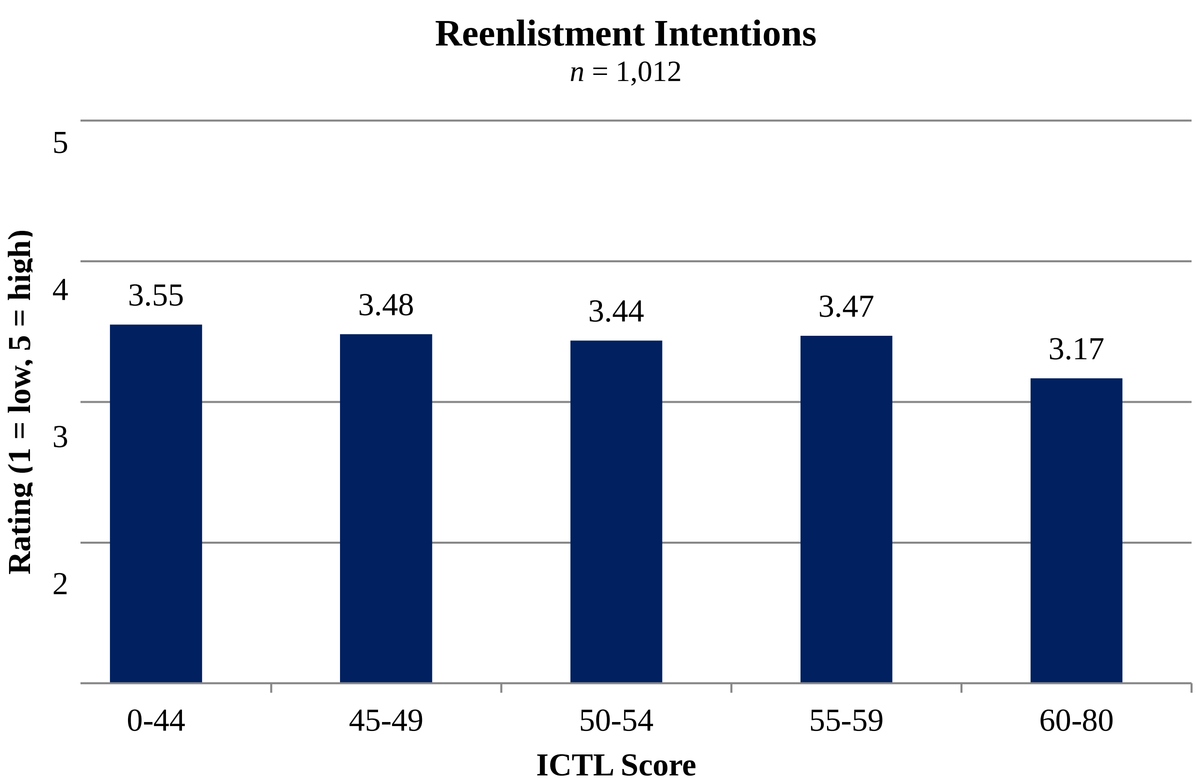


Figure 1. *Expectancy charts for career intentions and retention intention in the 25B MOS.*

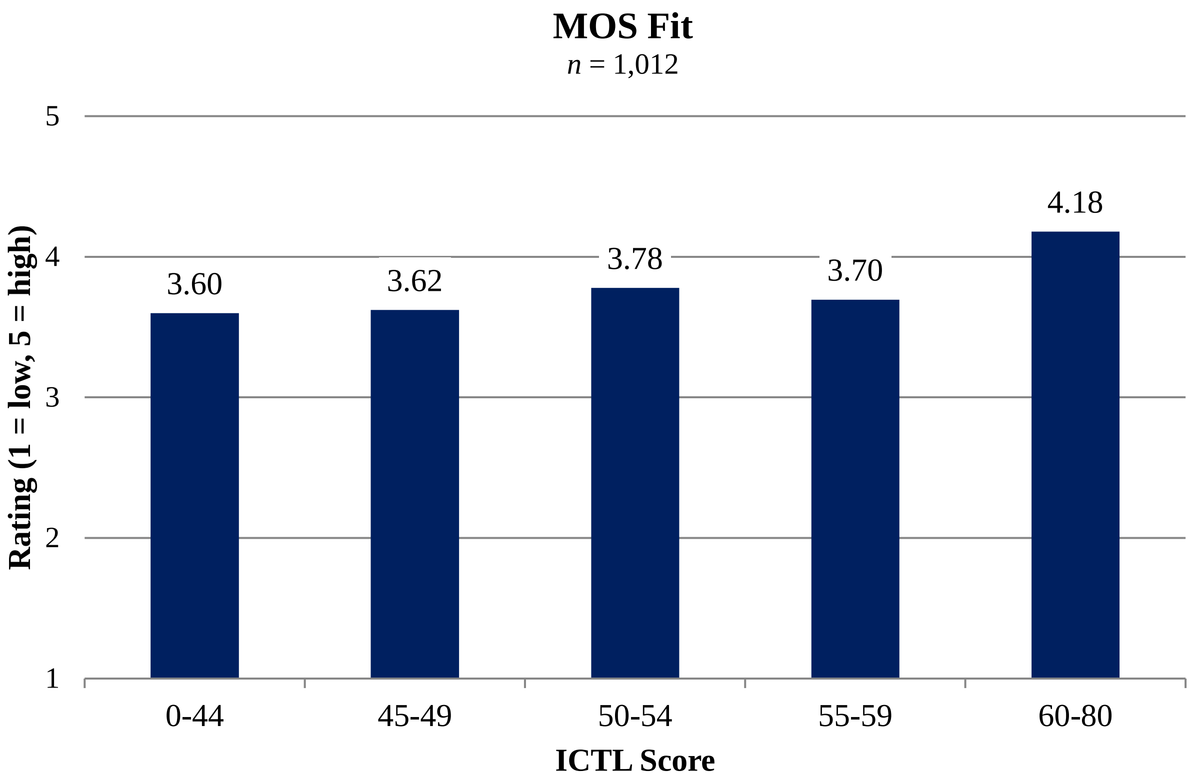
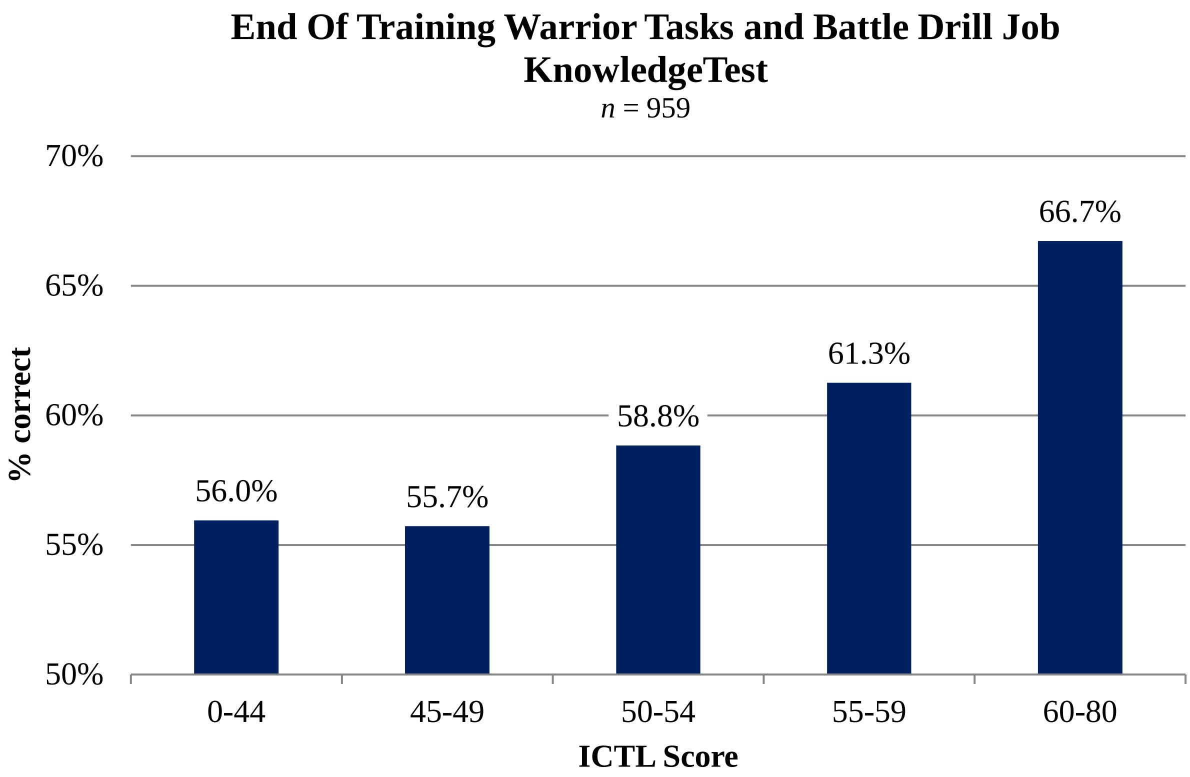


Figure 2. *Expectancy charts for perception of MOS fit in the 25B MOS.*



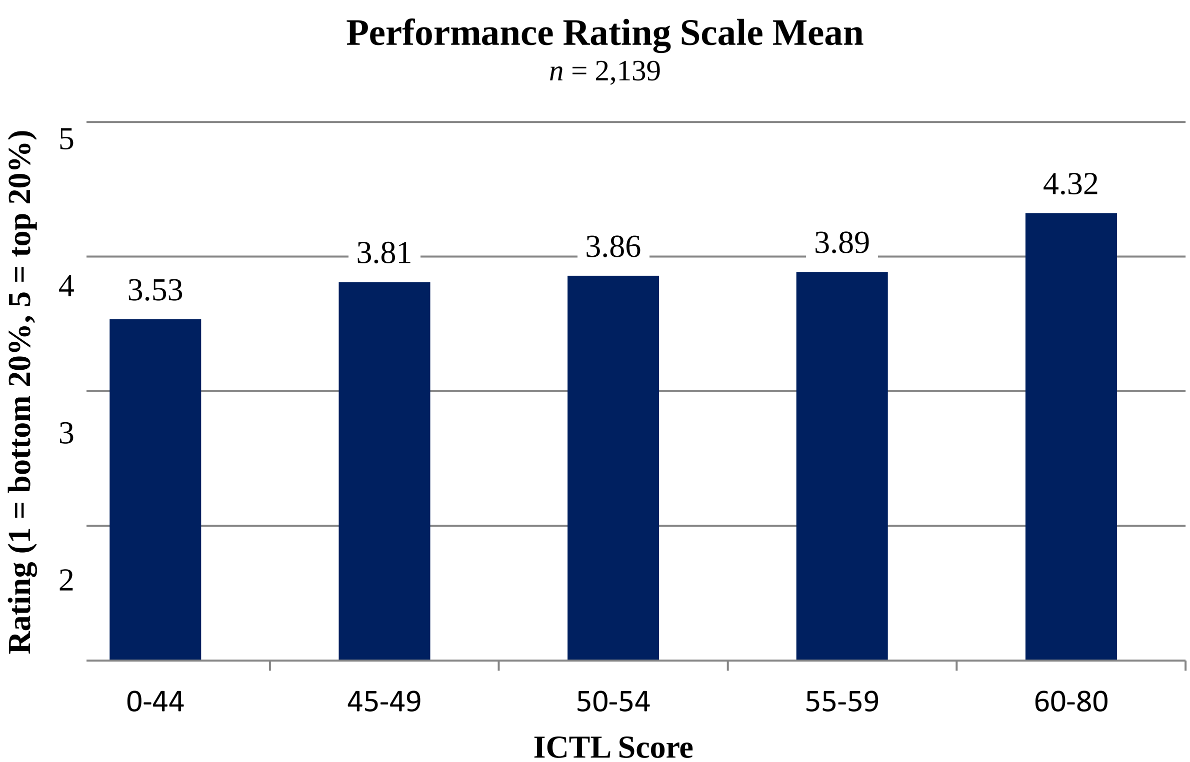
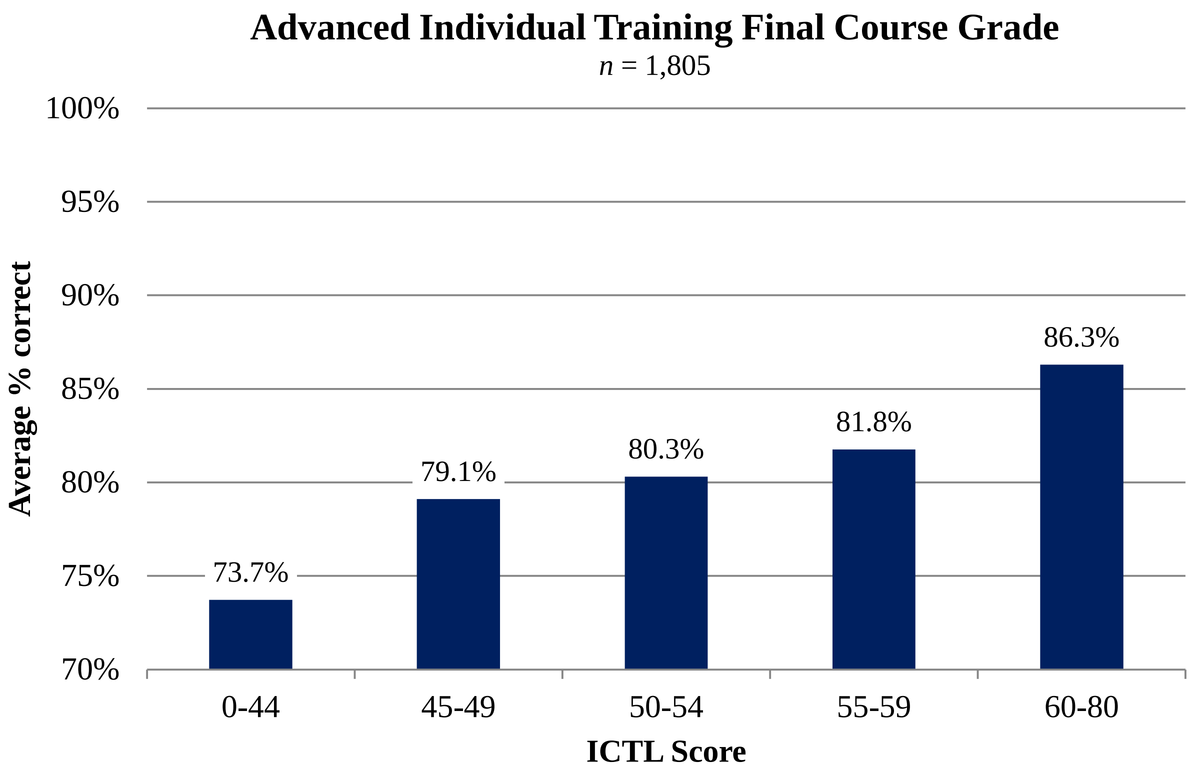


Figure 3. Expectancy charts for end of training job knowledge and performance outcomes in the 25B MOS.



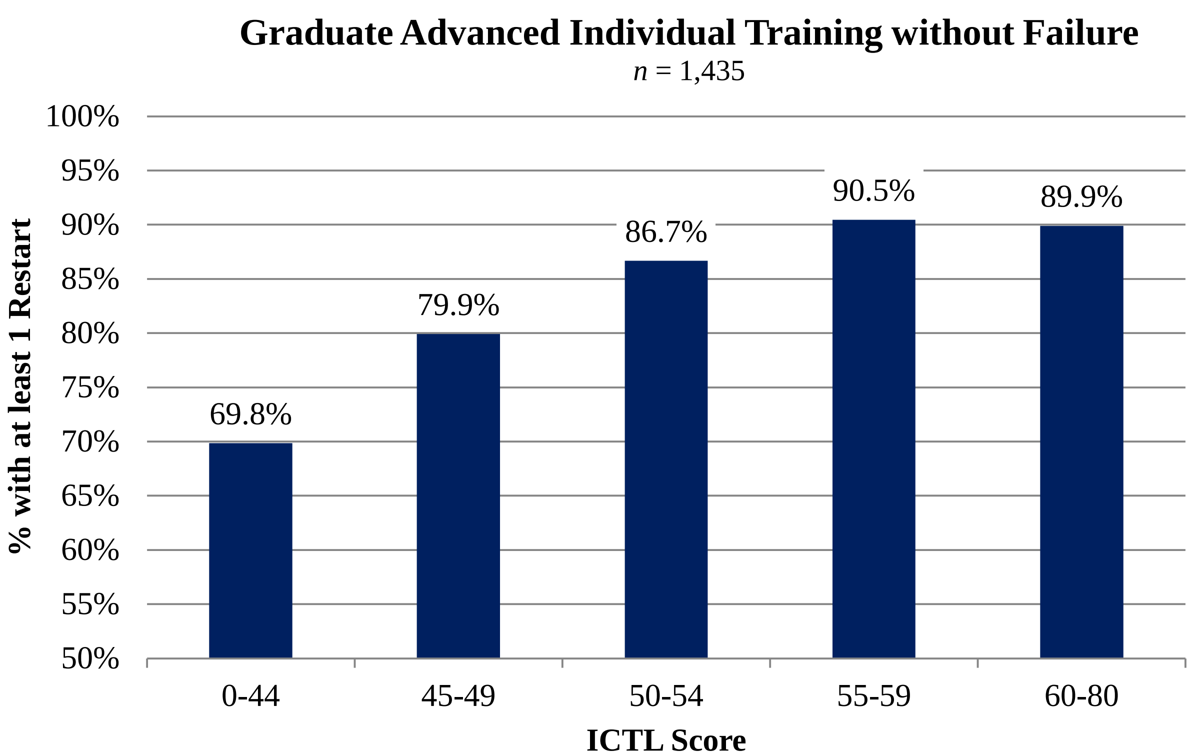
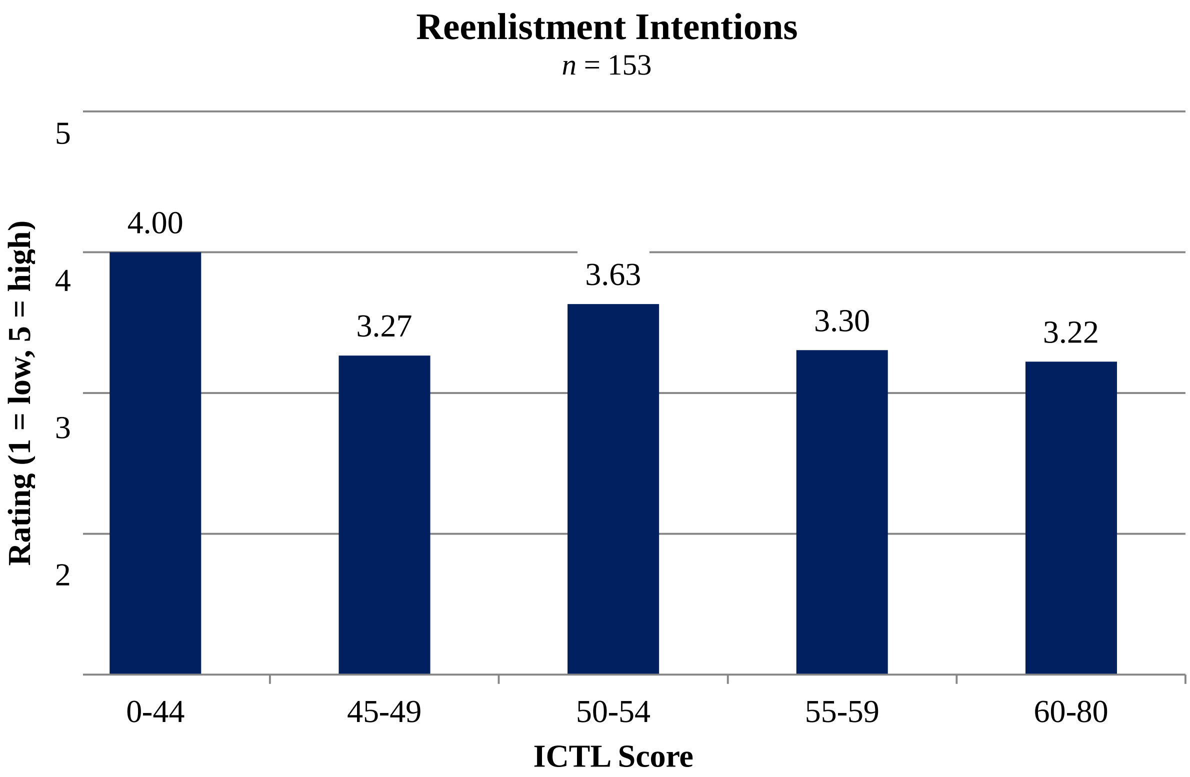


Figure 4. Expectancy charts for end of training job knowledge and performance outcomes in the 25B MOS.



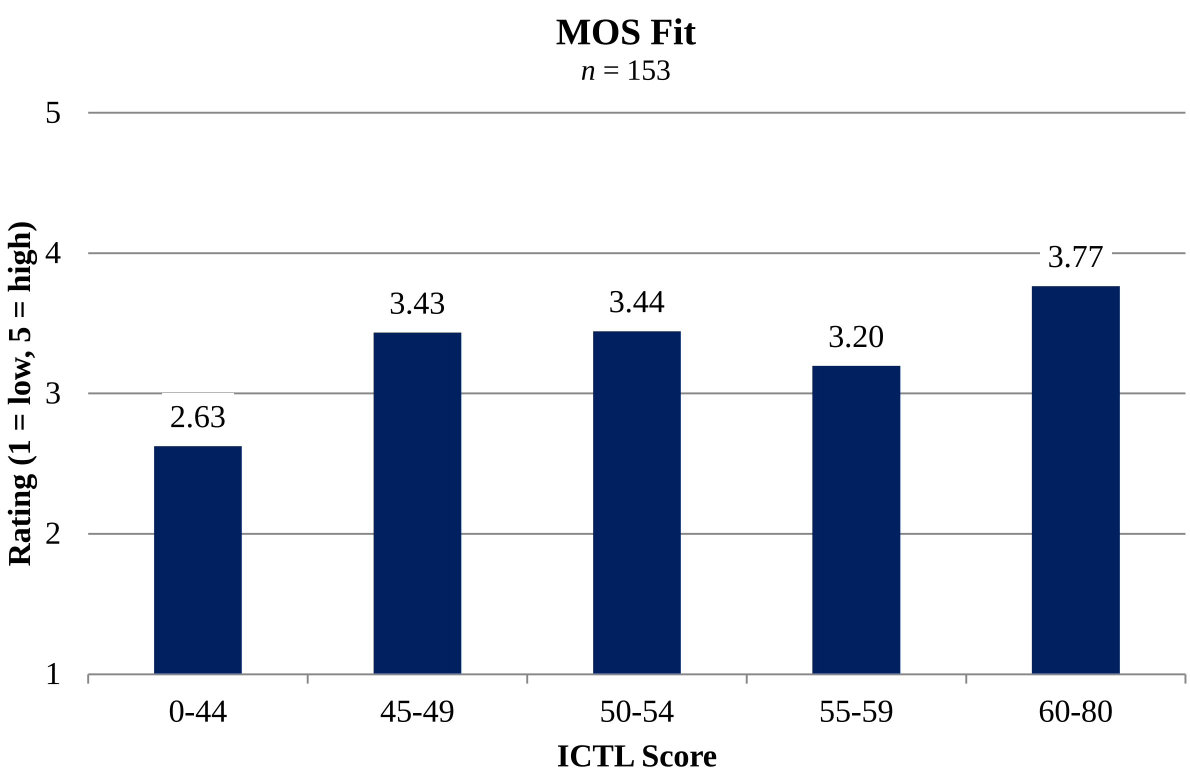
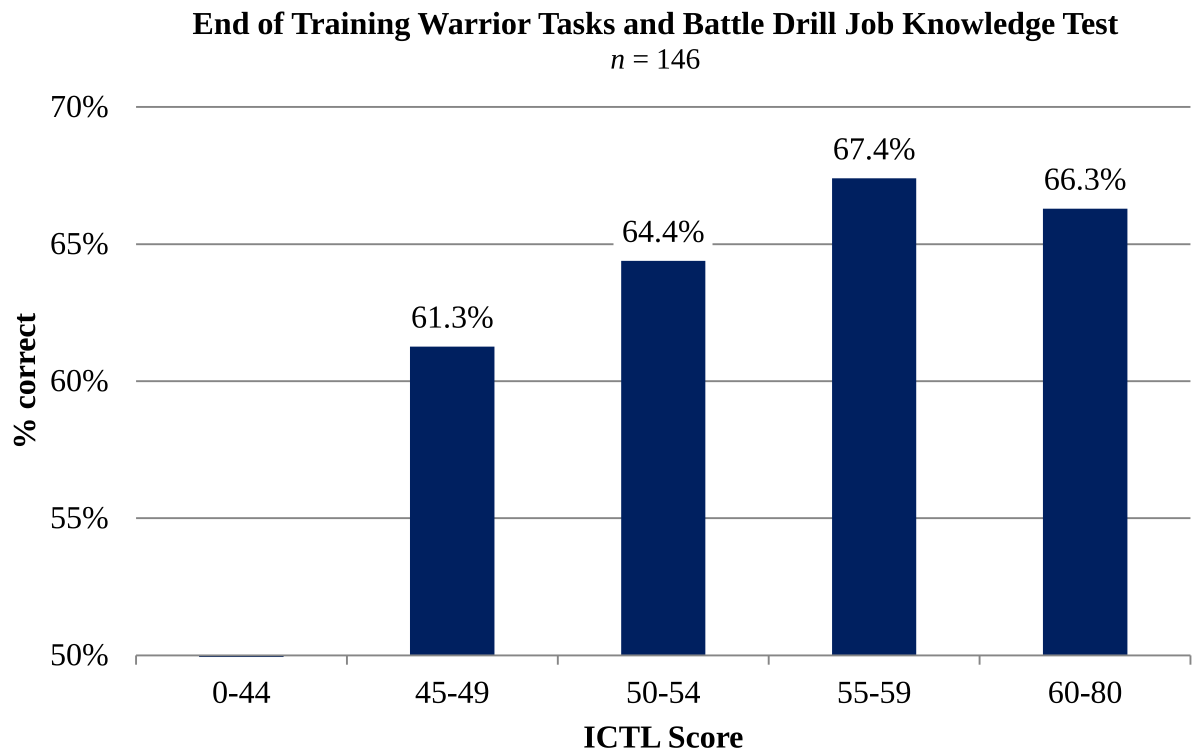


Figure 5. *Expectancy charts for retention intention and fit outcomes of MOS fit in the 25N MOS.*



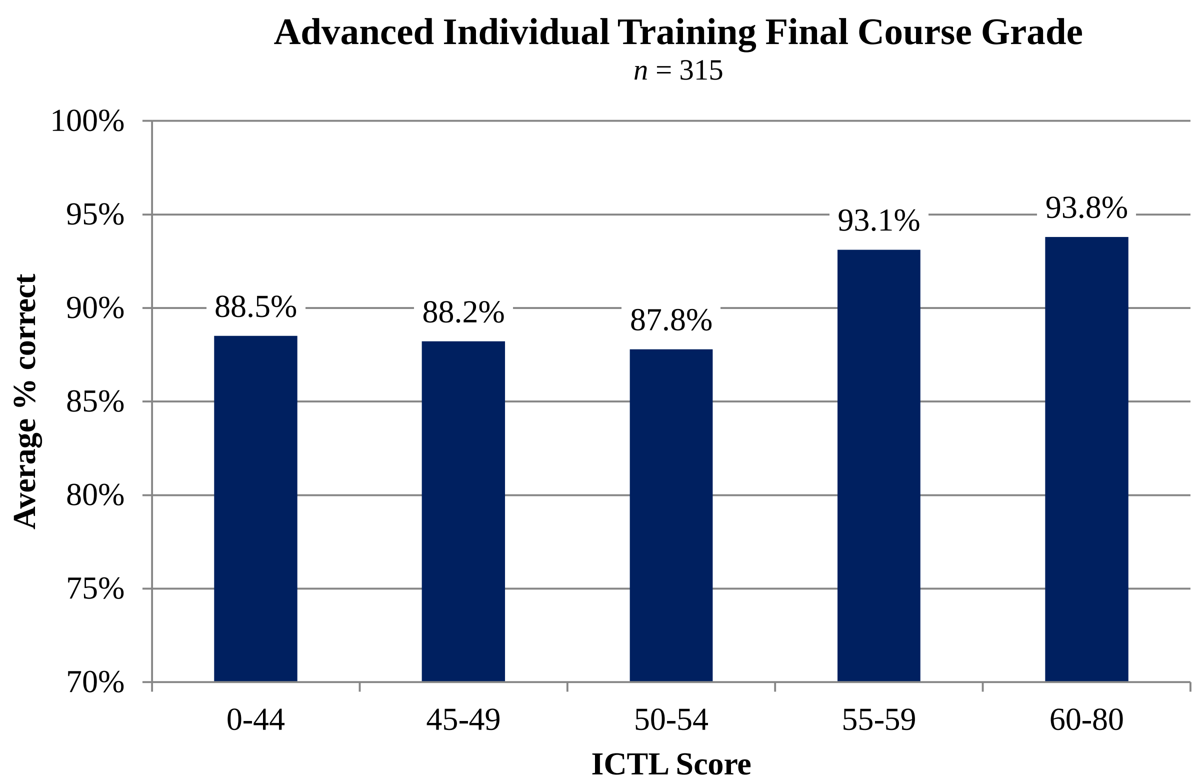


Figure 6. *Expectancy charts for end of training job knowledge and performance outcomes in the 25N MOS.*

Incremental Validity

We examined incremental validity of the ICTL test over existing ASVAB predictors by testing a series of hierarchical regression models, regressing each criterion measure onto Soldiers' ASVAB based score (i.e., AFQT, EI test, aptitude area composite) in the first step, followed by their ICTL score in the second step. The resulting increment in the multiple correlation (ΔR) when the ICTL score is added to the baseline regression models served as our index of incremental validity. For the continuously scaled criteria, the models were estimated using Ordinary Least Squares (OLS) regression. Alternatively, logistic regression was used for the dichotomous graduation criterion and the pseudo *R* value is reported (Nagelkerke, 1991). Note that although the pseudo *R* value is intended to approximate the OLS *R* values, it is not directly comparable and should only be used to compare models within a given nested set.

Table 11 presents the results of incremental validity analyses for job knowledge/performance criteria by MOS. Figure 7 presents much of the same information in the format of a histogram. More specifically, each histogram presents the validity coefficient for the aptitude area composite used for qualification[6] and the increment associated with the ICTL test. Incremental validity analyses have the strongest theoretical link to job knowledge/performance criteria because ASVAB and ICTL scores are intended to predict task or knowledge based performance outcomes. The ICTL test provides appreciable incremental validity beyond the AFQT and the aptitude area composites (i.e., EL, SC, ST) when predicting AIT grades in both MOS. ICTL scores provide substantial incremental validity beyond the EI test in predicting AIT grades and WTBD JKT scores in both MOS. With regard to the 25B MOS only, the ICTL test provides statistically significant and practically meaningful incremental validity beyond all ASVAB-based composites evaluated when predicting PRS means and graduation from AIT without a failure.

Table 12 presents the results of incremental validity analyses for fit and retention related criteria by MOS. Figure 8 presents much of the same information in the format of a histogram. Relatively fewer statistically significant results are observed. Moreover, a number of the relationships are negative. Note that multiple correlation values presented in Table 12 reflect only the strength of relationship and not the direction (i.e., *R* cannot achieve negative values). The most interesting finding is that the ICTL test provides the greatest incremental validity beyond the ASVAB in predicting perceptions of MOS fit in the 25B MOS, and that this relationship is a positive one. ICTL scores also provide incremental validity beyond the aptitude area composites in predicting MOS fit in the 25N MOS. It is likely that the ICTL test captures unique, job specific variance in this relationship that cannot be accounted for by the general aptitude variance component it shares with the ASVAB based predictors. That is, both the ASVAB and ICTL tests capture general aptitude and it may be that those of higher general aptitude perceive better MOS fit because they have a higher degree of success in a challenging MOS. The ICTL test also captures unique variance that is conceptually distinct from general aptitude and specifically related to the 25B and 25N MOS. This conceptual link between the content of the ICTL and the nature of the MOS may be a reflection of the "information test"

[6] Note that 25N requires qualification on both Electronics (EL) and Surveillance and Communications (SC) aptitude area composites. These two composite scores have a correlation of .99 in the current sample, so the figures only present increment over the SC composite.

notion discussed earlier that postulates individuals gravitate toward knowledge areas for which they have interest and motivation.

The general trend observed in Table 12 among the other criterion variables suggests those of higher aptitude tend to be less intent on reenlisting or making the Army a career. The ICTL test provides a small to moderate amount of incremental validity beyond ASVAB based measures in this regard.

Tables 13 and 14 present the incremental validity analyses corrected for multivariate range restriction on the ASVAB (Lawley, 1943). As with the bivariate relationships discussed above, we use a large sample (*n* = 483,737) of Army applicants as the unrestricted reference (see Knapp & LaPort, 2014 for details of the sample). In general, the pattern of relationships and amount of incremental variance provided is comparable to what is found in the restricted analyses found in Tables 11 and 12. The correction for multivariate range restriction tended to result in a slightly larger adjustment for the ASVAB test and composites than for the ICTL test. This is likely because the variances of ASVAB test and composites are adjusted directly to the population values and the ICTL test variances are indirectly adjusted based on their covariance with the ASVAB.

Table 11
Incremental Validity of ICTL in Predicting Job Knowledge/Performance Criteria

		AFQT+			EI+			EL +			SC +			ST +	
	AFQT *r*	ICTL *R*	Δ *R*	EI *r*	ICTL *R*	Δ *R*	EL *r*	ICTL *R*	Δ *R*	SC *r*	ICTL *R*	Δ *R*	ST *r*	ICTL *R*	Δ *R*
25B															
WTBD % Correct	**.44**	**.46**	**.02**	**.32**	**.39**	**.07**	**.44**	**.45**	**.01**	**.44**	**.45**	**.01**	**.45**	**.46**	**.01**
PRS Mean	**.30**	**.36**	**.06**	**.22**	**.33**	**.11**	**.33**	**.37**	**.04**	**.33**	**.37**	**.04**	**.33**	**.37**	**.04**
Final AIT Course Grade	**.39**	**.45**	**.06**	**.31**	**.42**	**.11**	**.45**	**.48**	**.03**	**.46**	**.49**	**.03**	**.46**	**.48**	**.03**
Grad AIT w/o Failure*	**.22**	**.25**	**.03**	.06	**.22**	**.15**	**.22**	**.24**	**.03**	**.23**	**.25**	**.02**	**.22**	**.25**	**.02**
25N															
WTBD % Correct	*.18*	*.23*	.05	.05	*.20*	*.15*	.13	.20	.07	.12	.20	.08	.13	.20	.07
PRS Mean	.04	.12	.09	.12	.15	.03	.09	.13	.04	.09	.13	.04	.08	.13	.05
Final AIT Course Grade	**.45**	**.54**	**.07**	**.26**	**.47**	**.19**	**.45**	**.52**	**.07**	**.47**	**.53**	**.06**	**.47**	**.53**	**.06**
Grad AIT w/o Failure*	.14	.15	.02	.06	.12	.06	.11	.14	.03	.13	.15	.02	.13	.15	.02

Note: AFQT = Armed Forces Qualification Test; EI = Electronics Information test; EL = Electronics composite; SC = Surveillance and Communication composite; ST = Skilled Technical composite.
Bold values are statistically significant at the .01 level. Italicized values are significant at the .05 level.
*Dichotomous criterion—pseudo *R* reported. Compare only within a row.

Table 12
Incremental Validity of ICTL in Predicting Fit and Retention Criteria

	AFQT	AFQT+			EI+			EL +			SC +			ST +	
	r	ICTL *R*	Δ *R*	EI *r*	ICTL *R*	Δ *R*	EL *r*	ICTL *R*	Δ *R*	SC *r*	ICTL *R*	Δ *R*	ST *r*	ICTL *R*	Δ *R*
25B															
Army Fit	-.04	.04	.00	-.02	.02	.00	-.05	.05	.00	-.05	.05	.00	-.05	.05	.00
Attrition Cognitions	-.01	.02	.01	-.02	.03	.01	-.01	.03	.02	-.01	.03	.02	-.01	.03	.02
Career Intentions	**-.17**	**.20**	**.03**	**-.09**	**.18**	**.09**	**-.18**	**.20**	**.02**	**-.18**	**.20**	**.02**	**-.19**	**.20**	**.02**
MOS Fit	**.20**	**.30**	**.10**	**.22**	**.30**	**.08**	**.23**	**.30**	**.07**	**.23**	**.30**	**.07**	**.22**	**.30**	**.08**
Reenlistment Intentions	**-.16**	**.18**	*.02*	*-.08*	**.15**	**.07**	**-.16**	**.17**	*.01*	**-.16**	**.17**	*.01*	**-.17**	**.18**	*.01*
25N															
Army Fit	.00	.12	.12	-.16	.17	.01	-.14	.15	.01	-.12	.14	.02	-.11	.13	.02
Attrition Cognitions	-.01	.19	.18	.16	.20	.04	.12	.18	.06	.10	.18	.08	.09	.18	.09
Career Intentions	**-.23**	**.23**	.00	-.06	.10	.04	*-.21*	*.21*	.00	*-.20*	*.20*	.00	*-.21*	*.21*	.00
MOS Fit	.02	.16	.14	.07	.16	.09	-.02	.19	*.17*	-.01	.18	*.17*	-.01	.18	*.17*
Reenlistment Intentions	*-.17*	*.20*	.03	-.10	.17	.07	*-.20*	*.21*	.01	*-.19*	*.21*	.02	*-.19*	*.21*	.02

Note: AFQT = Armed Forces Qualification Test; EI = Electronics Information test; EL = Electronics composite; SC = Surveillance and Communication composite; ST = Skilled Technical composite.
Bold values are statistically significant at the .01 level. Italicized values are significant at the .05 level.
*Dichotomous criterion—pseudo *R* reported. Compare only within a row.

Table 13

Incremental Validity of ICTL in Predicting Job Knowledge/Performance Criteria Corrected for Multivariate Range Restriction on the ASVAB

	AFQT *ρ*	AFQT+ ICTL *P*	Δ *P*	EI *ρ*	EI+ ICTL *P*	Δ *P*	EL *ρ*	EL + ICTL *P*	Δ *P*	SC *ρ*	SC + ICTL *P*	Δ *P*	ST *ρ*	ST + ICTL *P*	Δ *P*
25B															
WTBD % Correct	.56	.58	.02	.43	.51	.08	.56	.57	.01	.56	.57	.01	.57	.58	.01
PRS Mean	.41	.45	.04	.31	.42	.11	.43	.45	.02	.43	.46	.02	.43	.46	.02
Final AIT Course Grade	.51	.55	.04	.39	.51	.12	.54	.56	.02	.56	.57	.02	.55	.57	.02
25N															
WTBD % Correct	.29	.33	.04	.19	.29	.10	.26	.31	.05	.26	.31	.05	.26	.31	.05
PRS Mean	.12	.17	.05	.18	.20	.02	.17	.19	.02	.17	.19	.02	.16	.18	.02
Final AIT Course Grade	.68	.72	.04	.49	.64	.15	.68	.71	.03	.69	.72	.03	.69	.72	.03

Note: AFQT = Armed Forces Qualification Test; EI = Electronics Information test; EL = Electronics composite; SC = Surveillance and Communication composite; ST = Skilled Technical composite.

ρ indicates coefficients that were corrected for multivariate range restriction (Lawley, 1943).

Table 14

Incremental Validity of ICTL in Predicting Fit and Retention Criteria Corrected for Multivariate Range Restriction on the ASVAB

	AFQT *ρ*	AFQT+ ICTL *P*	Δ *P*	EI *ρ*	EI+ ICTL *P*	Δ *P*	EL *ρ*	EL + ICTL *P*	Δ *P*	SC *ρ*	SC + ICTL *P*	Δ *P*	ST *ρ*	ST + ICTL *P*	Δ *P*
25B															
Army Fit	-.06	.06	.00	-.04	.04	.00	-.07	.07	.00	-.07	-.07	.00	-.07	.07	.00
Attrition Cognitions	-.01	.03	.02	-.01	.03	.01	-.01	.02	.01	-.01	.02	.01	-.01	.03	.02
Career Intentions	-.25	.27	.02	-.18	.25	.07	-.26	.28	.01	-.26	.27	.01	-.26	.28	.01
MOS Fit	.27	.34	.07	.27	.35	.08	.29	.35	.06	.29	.35	.06	.29	.34	.06
Reenlistment Intentions	-.22	.24	.02	-.16	.22	.06	-.23	.24	.01	-.23	.24	.01	-.24	.25	.01
25N															
Army Fit	-.07	.16	.09	-.24	.24	.00	-.20	.20	.00	-.18	.19	.01	-.17	.18	.01
Attrition Cognitions	.04	.22	.18	.22	.24	.02	.16	.20	.04	.14	.20	.06	.13	.20	.07
Career Intentions	-.36	.36	.00	-.28	.29	.01	-.37	.37	.00	-.37	.37	.00	-.36	.36	.00
MOS Fit	.01	.16	.15	.04	.15	.11	-.03	.20	.17	-.02	.19	.17	-.02	.19	.17
Reenlistment Intentions	-.31	.33	.02	-.27	.31	.04	-.34	.35	.01	-.34	.35	.01	-.33	.34	.01

Note: AFQT = Armed Forces Qualification Test; EI = Electronics Information test; EL = Electronics composite; SC = Surveillance and Communication composite; ST = Skilled Technical composite.

ρ indicates coefficients that were corrected for multivariate range restriction (Lawley, 1943).

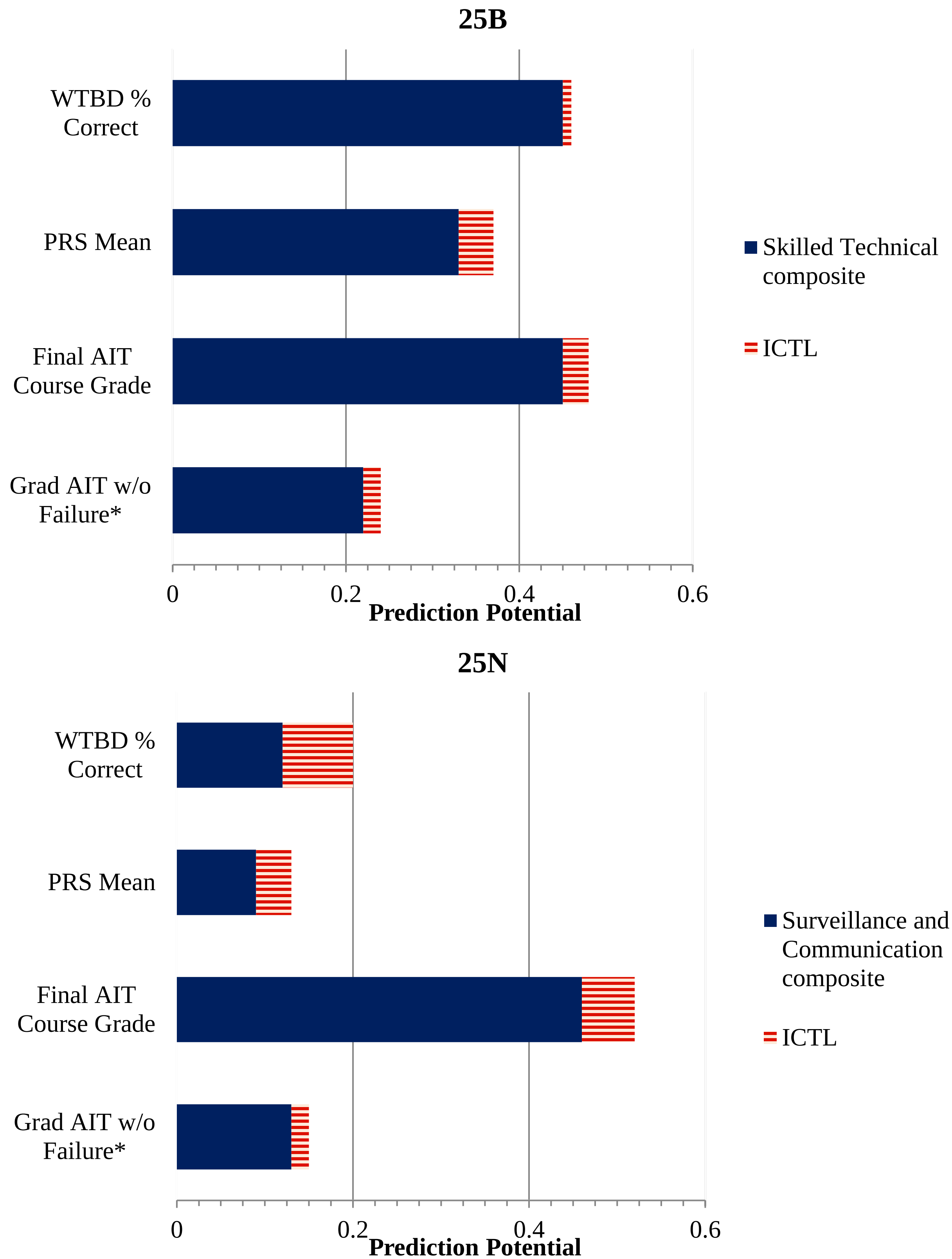


Figure 7. *Incremental validity of ICTL in predicting job knowledge/performance criteria.*

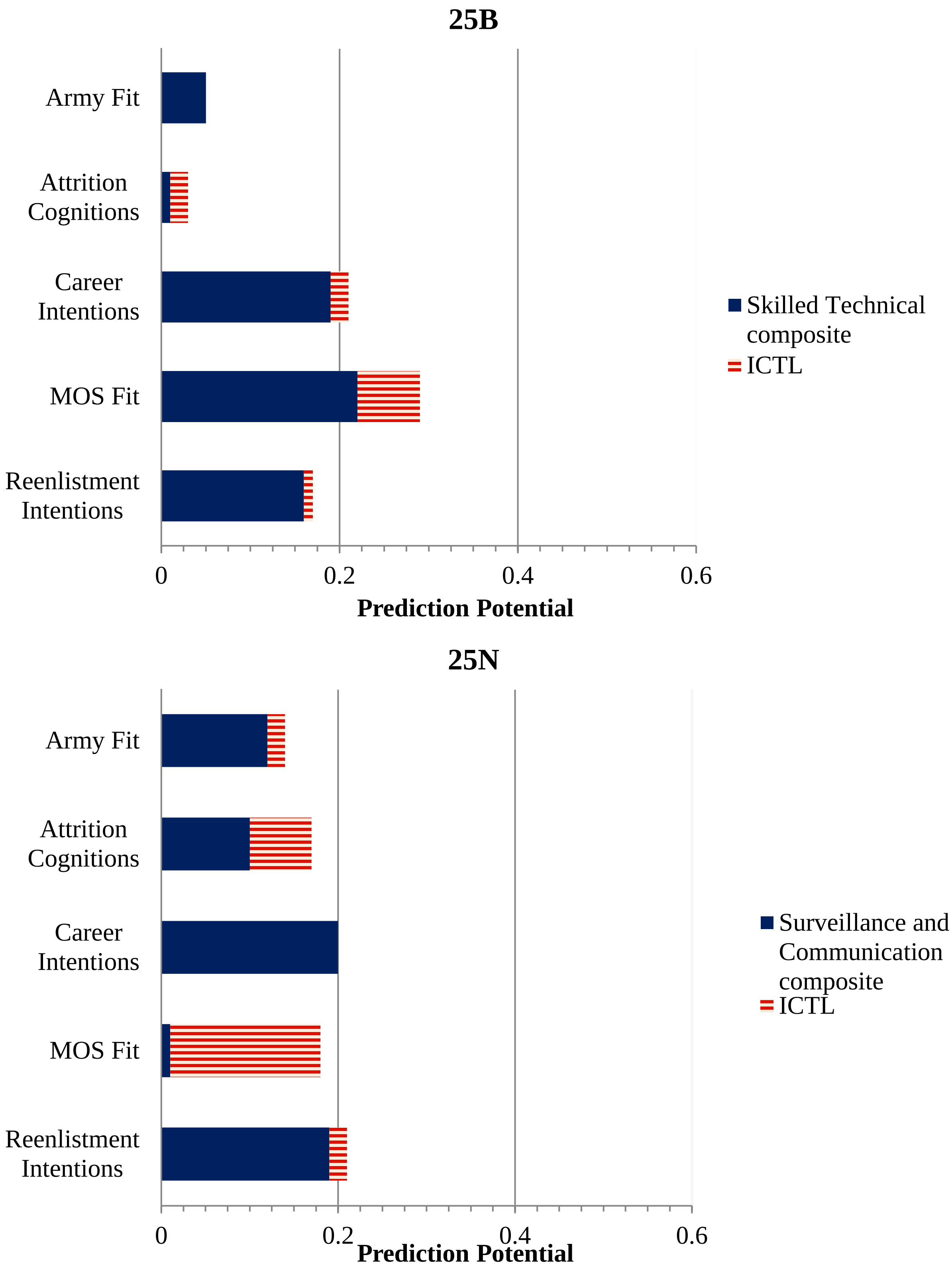


Figure 8. Incremental validity of ICTL in predicting job knowledge/performance criteria.[7]

[7] The absence of a patterned bar in the histogram indicates that no evidence of incremental validity was observed.

Fairness Analyses

As a final component to the project, we examined group differences in test scores as well as predictive bias with regard the ICTL test for gender and racial/ethnic subgroups. Subgroup differences and disparities in pass rates are important to monitor as they reflect how use of a test or selection system impacts the demographic composition of incoming Soldiers and the extent to which that composition is representative of the population at large. Furthermore, from an ethical and fairness standpoint, predictors should not be biased against groups due to factors unrelated to performance requirements as a Soldier.

In this section, we first report information pertaining to standardized subgroup mean differences on the ICTL test for gender and racial/ethnic subgroups in both 25B and 25N MOS. Next, we examine the presence and extent of differential validity, pertaining to group differences in validity coefficients, and differential prediction, pertaining to group differences in the regression of criterion outcomes on predictor scores (Berry, Clark, & McClure, 2011). Differential validity and prediction analyses focused on AIT grades, AIT graduation status, and peer performance rating scales (PRS). In addition, because the ICTL test can be thought of as an indirect measure of interest, intrinsic motivation, and skill relevant to cyber-related work, we also included MOS fit as outcome for differential validity and prediction analyses. For analyses reported in this subsection, five groups were examined: males (25B n = 1,371; 25N n = 254), females (25B n = 359; 25N n = 39), non-Hispanic Blacks (25B n = 522; 25N n = 62), non-Hispanic Whites (25B n = 803; 25N n = 164), and Hispanic Whites (25B n = 247; 25N n = 37). Analyses were carried out for three comparisons: male vs. female, non-Hispanic White vs. Hispanic White, and non-Hispanic White vs. non-Hispanic Black. These groups were chosen to be consistent with designations used by the ASVAB testing program (Defense Manpower Data Center, 2011).

Given common levels of validity, criterion reliability, and other contextual factors affecting statistical power, differential validity and differential prediction analyses require relatively large overall and subgroup sample sizes in order to be sufficiently powerful (e.g., Aguinis, Culpepper, & Pierce, 2010); consequently, these analyses were conducted only for 25B given the relatively small minority group sample sizes for 25N. Finally, to provide a frame of reference for the results observed for the ICTL test, we also examine results for the ASVAB Electronics Information (EI) subtest and several area aptitude composites relevant to cyber occupations in the Armed Forces, namely the Skilled-Technical (ST), Electrical (EL), and Surveillance and Communication (SC) Composites.

Results pertaining to the fairness analyses are shown in Tables 15 and 16 (more detailed results are available in the Appendix; see Tables A6-A14). Table 15 shows results pertaining to subgroup mean differences for the ICTL test and ASVAB subtest and composites within the 25B and 25N MOS. For 25B, d values for the ICTL test were in the 0.40-0.60 *SD* range across the comparisons conducted; these differences would be considered relatively moderate in magnitude (Cohen, 1992). For each comparison within 25B, group mean differences for the ICTL test were uniformly smaller than corresponding differences for the ASVAB scores. For 25N, d values for the ICTL test were somewhat smaller than those observed in for 25B, ranging from approximately -.20 to -0.50 across the comparisons conducted. With one exception (the EI subtest for the Black/White comparison), group mean differences for the ICTL test were uniformly smaller than those observed for the ASVAB EI subtest and area composites, a finding which is similar to that for 25B.

Table 16 shows results pertaining to differential validity and differential prediction analyses for Female/Male, Hispanic/White, and Black/White comparisons. Berry, Cullen and Meyer (2014) found that subgroup differences in range restriction in military samples, arising from strong reliance on cognitive tests in conjunction with strict use of cutoff scores, may act as a partial source of observed group differences in criterion-related validity estimates (see also Roth, Le, Oh, van Iddekinge, Buster, Robbins, & Campion, 2014). Consequently, we corrected for multivariate range restriction (Lawley, 1943) using each subgroup's covariance matrix and conducted subsequent analyses using the within-group corrected matrices. Significance tests were carried out only on the uncorrected estimates in Table 16 due to lack of analytical standard errors and test statistics for the corrected estimates.

For the ICTL test, only one instance of a non-zero between-group difference in validity was observed for the White/Hispanic comparison (MOS fit). Multiple instances of group differences in validity were observed for the EI subtest and composites for each comparison, including gender (AIT grades, PRS), White/Hispanic (AIT grades, AIT graduation status, and MOS fit), and White/Black (PRS).

With respect to differential prediction (indicated by a significant predictor-group interaction term in the regression of an outcome on the predictor, group membership, and the aforementioned interaction term), there were no observed instances for the ICTL test where the difference suggested a steeper slope for the majority group, as indicated by a negative estimate. Rather, the one instance of a significant predictor-group interaction term (Black/White comparison for AIT graduation status) indicated that the minority group had a slightly higher slope than did the majority group meaning the predictor was more predictive for the comparison group. In multiple instances, significant predictor-group interactions were found involving the ASVAB EI subtest or area composites. For gender, significant interactions were found involving the EI subtest in predicting both AIT grades and PRS. For the Hispanic/White comparison, significant interactions were found involving the EI subtest in predicting AIT grades and for the EI subtests and all area composites in predicting MOS fit. Aside from the aforementioned interaction involving the EI subtest for AIT graduation status, no additional predictor-group interactions were found for the Black/White comparison.

Table 15
Gender and Racial/Ethnic Subgroup Standardized Group Mean Differences (Cohen's d) among Predictor and Criterion Variables in 25B and 25N MOS

	25B			25N		
Measure	Female / Male	Black / White	Hispanic / White	Female / Male	Black / White	Hispanic / White
Predictors						
ICTL Scaled Score	**-0.52**	**-0.62**	**-0.42**	-0.34	**-0.53**	-0.19
ASVAB: EI Subtest	**-0.84**	**-0.77**	**-0.49**	**-0.70**	**-0.44**	**-0.41**
ASVAB: Skilled-Technical Composite	**-0.62**	**-0.91**	**-0.67**	**-0.44**	**-0.77**	**-0.61**
ASVAB: Electrical Composite	**-0.72**	**-0.96**	**-0.67**	**-0.56**	**-0.79**	**-0.64**
ASVAB: Surveillance and Communication Composite	**-0.65**	**-0.89**	**-0.64**	**-0.47**	**-0.72**	**-0.57**
Criteria						
Final AIT course grade	-0.10	**-0.46**	-0.18	-0.23	**-0.45**	0.16
AIT graduation status	0.05	**-0.16**	-0.04	0.23	0.11	-0.04
Peer performance rating scales (PRS)	**-0.32**	**-0.30**	**-0.23**	-0.19	0.18	-0.01
MOS fit	**-0.57**	**-0.21**	-0.17	**-0.64**	**0.65**	-0.14

Note. The minority group is the referent group for the comparisons. For 25B, subgroup sample size is 1,371 for Males, 359 for Females, 522 for Blacks, 247 for Hispanics, and 803 for Whites. For 25N, subgroup sample size is 254 for Males, 39 for Females, 62 for Blacks, 37 for Hispanics, and 164 for Whites. Significant Cohen's *d* values, based on an independent sample *t*-test between the group means, are bolded ($p < .05$, two-tailed).

Table 16

Gender and Racial/Ethnic Subgroup Criterion-related Validity Estimates and Moderated Multiple Regression Results for Differential Prediction Analyses

	Female/Male						Hispanic/White						Black/White					
	Correlations				Predictor × Group		Correlations				Predictor × Group		Correlations				Predictor × Group	
	Male		Female				White		Hispanic				White		Black			
Criterion / Predictor	r	r_{RRC}	r	r_{RRC}	b	b_{RRC}	r	r_{RRC}	r	r_{RRC}	b	b_{RRC}	r	r_{RRC}	r	r_{RRC}	b	b_{RRC}
Final AIT course grade																		
ICTL Scaled Score	**.43**	.50	**.28**	.43	-0.12	-0.01	**.41**	.46	**.29**	.36	-0.17	-0.17	**.41**	.46	**.32**	.46	0.06	0.24
ASVAB: EI Subtest	***.36***	.41	*.10*	.31	**-0.28**	-0.08	***.34***	.37	*.08*	.17	**-0.30**	-0.27	**.34**	.37	**.22**	.39	-0.05	0.14
ASVAB: Skilled-Technical Composite	***.49***	.56	***.28***	.49	-0.08	-0.03	***.52***	.57	***.28***	.35	-0.18	-0.17	**.52**	.57	**.37**	.56	0.12	0.15
ASVAB: Electrical Composite	***.49***	.56	***.29***	.48	-0.07	-0.02	***.51***	.56	***.26***	.34	-0.17	-0.17	**.51**	.56	**.36**	.56	0.11	0.15
ASVAB: Surveillance and Communication Composite	***.50***	.57	***.29***	.49	-0.08	-0.03	***.52***	.57	***.27***	.35	-0.17	-0.17	**.52**	.57	**.39**	.57	0.15	0.16
AIT graduation status																		
ICTL Scaled Score	**.17**	.23	**.13**	.23	0.00	0.00	**.14**	.17	.10	.09	0.00	0.00	**.14**	.17	**.21**	.30	**0.01**	0.01
ASVAB: EI Subtest	**.07**	.13	.01	.11	0.00	0.00	.08	.09	-.02	.00	0.00	0.00	.08	.09	.00	.11	0.00	0.00
ASVAB: Skilled-Technical Composite	**.17**	.24	**.14**	.27	0.00	0.00	***.19***	.22	*.03*	.04	0.00	0.00	**.19**	.22	**.14**	.28	0.00	0.00
ASVAB: Electrical Composite	**.17**	.23	**.13**	.26	0.00	0.00	***.18***	.21	*.03*	.04	0.00	0.00	**.18**	.21	**.14**	.28	0.00	0.00
ASVAB: Surveillance and Communication Composite	**.18**	.24	**.14**	.27	0.00	0.00	**.19**	.22	.04	.04	0.00	0.00	**.19**	.22	**.15**	.29	0.00	0.00
Peer performance rating scales (PRS)																		
ICTL Scaled Score	**.33**	.41	**.23**	.30	0.00	-0.01	**.34**	.40	**.26**	.31	0.00	0.00	**.34**	.40	**.23**	.33	-0.01	0.00
ASVAB: EI Subtest	***.22***	.31	*.01*	.13	**-0.02**	-0.01	**.24**	.27	.12	.19	-0.01	-0.01	**.24**	.27	.10	.21	-0.01	0.00
ASVAB: Skilled-Technical Composite	***.34***	.44	*.13*	.25	-0.01	-0.01	**.36**	.42	**.22**	.27	0.00	-0.01	***.36***	.42	***.21***	.35	0.00	0.00
ASVAB: Electrical Composite	***.34***	.43	*.12*	.25	-0.01	-0.01	**.35**	.41	**.24**	.29	0.00	-0.01	***.35***	.41	***.20***	.34	0.00	0.00
ASVAB: Surveillance and Communication Composite	***.34***	.44	*.12*	.24	-0.01	-0.01	**.35**	.42	**.23**	.28	0.00	-0.01	***.35***	.42	***.20***	.35	0.00	0.00
MOS fit																		
ICTL Scaled Score	**.26**	.30	**.23**	.34	0.00	0.01	***.34***	.37	*.15*	.16	-0.02	-0.02	**.34**	.37	**.21**	.27	-0.01	-0.01
ASVAB: EI Subtest	**.16**	.20	**.18**	.29	0.01	0.01	***.26***	.29	*.06*	.07	**-0.02**	-0.02	**.26**	.29	**.14**	.19	-0.01	-0.01
ASVAB: Skilled-Technical Composite	**.18**	.24	**.17**	.32	0.01	0.01	***.27***	.31	*.02*	.07	**-0.02**	-0.01	**.27**	.31	**.14**	.23	-0.01	0.00
ASVAB: Electrical Composite	**.18**	.23	**.20**	.33	0.01	0.01	***.27***	.31	*.02*	.06	**-0.02**	-0.01	**.27**	.31	**.15**	.24	-0.01	0.00
ASVAB: Surveillance and Communication Composite	**.18**	.24	**.19**	.33	0.01	0.01	***.26***	.31	*.02*	.06	**-0.02**	-0.01	**.26**	.31	**.16**	.24	0.00	0.00

Note. Uncorrected estimates based on the validation sample; corrected estimates based on range restriction corrections as explained in text. The values for the Predictor x Group cross-product terms are unstandardized coefficients for a model that includes the focal predictor measure, demographic variable (coded as 0 = Majority, 1 = Minority), and the interaction between the focal predictor and the demographic variable. Sample sizes for Males range from 413 to 1,132; for Females, from 111 to 303; for Whites, from 245 to 642; for Hispanics, from 71 to 219, and; for Blacks, from 157 to 442. For all tabled values, bolded values are those where $p < .05$. Italicized correlations are those where the difference between the Majority and Minority estimates is significant at two-tailed $p < .05$.

Discussion

There are a few issues to keep in mind in evaluating these results. First, incremental validity analyses do not reflect the way the ASVAB is used operationally. Incremental validity analyses assume that the ASVAB is used optimally (i.e., as a top-down selection tool). The assumption is not valid. Each Service sets a minimum AFQT score for entry into the Service; while AFQT is a continuous variable, it is used dichotomously. Aptitude area composites are used in a similar manner for MOS assignment. The question incremental validity analyses really address is "how much additional prediction would the new test provide, if the ASVAB were used optimally." As the ASVAB is not used optimally, these incremental validity estimates are conservative and may underestimate the actual selection efficiency of the new test.

Regardless, incremental validity is an index the Services have been using to evaluate new predictors for more than 20 years. Importantly, the estimates reported here are comparable to those previously reported for the science and technical tests of the ASVAB. For example, Oppler, Russell, Rosse, Keil, Meiman, and Welsh (1997) reported incremental validities from a Joint-Service study that included 13 technical training schools. Validities for each ASVAB test were computed using only the training schools that included that test in their selection composites. For example, 10 training schools used General Science in their composites and only those 10 schools were included in the validity estimates. Average incremental validity estimates beyond AFQT, after correction for multivariate range restriction, ranged from .012 for EI to .034 for Auto and Shop Information. It is also important to note that military research suggests that even small amounts of incremental validity (e.g., .02) can have utility in large selection programs (Held, Fedak, Crookenden, & Blanco, 2002; Schmidt, Dunn, & Hunter, 1995).

Summary and Conclusion

Results suggest that the ICTL test has potential as a valid and highly efficient predictor of valued outcomes in United States Army Cyber Center of Excellence MOS. Not only is the ICTL test a valid predictor of job knowledge and performance related criteria such as course grades, but is also a valid predictor of perceived MOS fit. This finding lends support to the notion of the ICTL test functioning as an indirect measure of interest, intrinsic motivation, and skill in a particular area. Just as the Automotive and Shop (AS) test can be thought of as a way to identify hobbyists who like to work on cars or motorcycles and are therefore more likely to perceive better fit in automotive related MOS (e.g., Light Wheel Vehicle Mechanic; 91B), the ICTL is likely operating at some level to capture variance related to applicants in the information technology (IT) domain who like to do things like build computers and configure elaborate home networks.

What is perhaps most notable about the pattern of validity and incremental validity results found in Tables 11 through 14 is the ICTL test's efficiency of prediction in these Signal MOS. In general, the ICTL test predicts performance just as well as composites derived from multiple ASVAB tests. Moreover, the ICTL test explains additional variance beyond these composites in almost every criterion measure. Validity of the ICTL test is substantially greater than its closest counterpart in the ASVAB, the EI test, in predicting performance in these particular MOS. Thus it represents a useful supplement to ASVAB for cyber occupations.

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Appendix

Table A1
25B Training Performance Rating Scales

Learns to implement a network

- Identifies and installs network infrastructure devices.
- Develops and manages an IP address scheme.
- Integrates network topology design.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns hardware concepts

- Identifies hardware components.
- Recognizes hardware compatibility.
- Installs, replaces, and maintains hardware.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns to administer software applications

- Installs operating systems (e.g., Windows, Linux).
- Administers software changes using command line and software utilities.
- Recognizes software compatibility.
- Performs basic software operations on DoD-approved software.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns the fundamentals of network security

- Implements security policies (e.g., password security).
- Controls access to network resources.
- Identifies different classification levels (e.g., green vs. blue vs. red).
- Performs incident handling procedures.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Table A1 (continued)
25B Training Performance Rating Scales

Learns the basics of troubleshooting

- Learns how signals flow through equipment.
- Explains solutions to users.
- Consults flow charts, diagrams, and other resources (e.g., Microsoft Knowledge Base).
- Inspects and services hardware and software (e.g., preventative checks and maintenance).

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns safety procedures

- Manages power sources (e.g., performs controlled startup and shutdown procedures, ensure equipment compatibility with power sources such as generators).
- Checks for proper grounding.
- Removes personal jewelry (e.g., watches, rings) before working on equipment.
- Follows safety instructions and warnings.
- Identifies trip hazards (e.g., unsecured wires/cables).

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Table A2

25N Training Performance Rating Scales

Learns to configure devices

- Identifies and configures equipment (e.g., routers, switches, REDCOM, PROMINA).
- Uses NVRAM and ROM appropriately (e.g. saves information to a flash drive or compact disc).
- Conducts file transfers between devices.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns troubleshooting techniques

- Performs patching (normal patch and outer normal patch).
- Consults technical manual, flow charts and/or diagrams.
- Conducts ping tests from one device to another (e.g., computer to gateway router).
- Inspects and services hardware and software (e.g., preventative checks and maintenance).

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns to maintain communications security (COMSEC)

- Maintains operation security (e.g., access to safes, accounting for controlled cryptographic items (CCI)).
- Maintains transmission security (e.g., rules for encryption, using encryption devices).
- Uses various types of encryption devices for maintaining security.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns Internet and network architecture

- Assigns IP addresses.
- Configures LANs and WANs.
- Scales a network using sub-netting.
- Identifies cables required for connections (e.g., serial, Ethernet, fiber-optic).

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Table A2 (continued)

25N Training Performance Rating Scales

Learns to gain access to devices through multiple sources

- Accesses a terminal server (e.g., MRV).
- Uses applications to access devices (e.g., Pumpkin, PUTTY).
- Configures a hyper terminal.
- Accesses the KVM.
- Uses a URL to access devices.
- Telnets to devices.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns the difference between TDMA and FDMA

- Identifies the types of devices that transmit TDMA and FDMA.
- Identifies the signal flow through the appropriate devices (e.g., multiplexer, TacLANe).
- Identifies ports for TDMA and FDMA devices.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns about Internet security

- Differentiates among various malicious attacks (e.g., worms, Trojan horses, phishing).
- Understands the purpose of a firewall and brings a firewall online.
- Uses HTTP and HTTPS appropriately.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Learns proper safety procedures

- Manages power sources (e.g., controlled startup and shutdown procedures).
- Follows safety instructions and warnings.
- Checks for proper grounding.
- Removes personal jewelry (e.g., watches, rings) before working on equipment.

1	2	3	4	5
Among the Weakest (in the bottom 20% of Soldiers in your class)	Below Average (in the bottom 40% of Soldiers in your class)	Average (better than the bottom 40% of Soldiers in your class, but not as good as the top 40%)	Above Average (in the top 40% of Soldiers in your class)	Among the Strongest (in the top 20% of Soldiers in your class)

Table A3

Summary of All ALQ Scale Scores by MOS

ALQ Scale	25B (*n* =1,012)					25N (*n* = 153)			
	α*	M	SD	Min	Max	M	SD	Min	Max
Affective Commitment	.86	3.8	0.7	1.0	5.0	3.7	0.7	1.6	5.0
Army Civilian Comparison	.79	3.7	0.8	1.0	5.0	3.8	0.7	1.2	5.0
Army Fit	.86	4.0	0.6	1.0	5.0	3.9	0.6	2.1	5.0
Army Life Adjustment	.88	4.0	0.7	1.0	5.0	4.0	0.6	2.2	5.0
Attrition Cognitions	.75	1.6	0.6	1.0	4.0	1.7	0.7	1.0	4.8
Career Intentions	.91	3.1	1.1	1.0	5.0	2.9	1.0	1.0	5.0
Disciplinary Actions	--	0.3	0.7	0.0	5.0	0.5	0.9	0.0	7.0
MOS Fit	.93	3.8	0.8	1.1	5.0	3.6	0.8	1.1	5.0
Normative Commitment	.80	4.0	0.7	1.0	5.0	4.0	0.7	1.4	5.0
Reenlistment Intentions	.81	3.4	0.9	1.0	5.0	3.3	0.9	1.0	5.0
Training Achievements	--	0.3	0.5	0.0	2.0	0.2	0.4	0.0	1.0
Training Failures	--	0.5	0.7	0.0	3.0	0.5	0.7	0.0	3.0

*Coefficient alpha computed using 25B and 25N samples combined.

Table A4

Correlations among Predictor and Criterion Variables in 25B MOS

#	Variable	*n*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	ICTL	1,805																						
2	EI	1,746	**.51**																					
3	AFQT	1,746	**.55**	**.46**																				
4	EL	1,746	**.61**	**.77**	**.85**																			
5	SC	1,746	**.61**	**.74**	**.88**	**.99**																		
6	ST	1,746	**.61**	**.69**	**.90**	**.99**	**.99**																	
7	Army Civ. Comparison	1,004	**-.18**	**-.13**	**-.20**	**-.21**	**-.21**	**-.22**																
8	Affective Commitment	1,012	*-.07*	-.06	**-.10**	**-.11**	**-.11**	**-.11**	**.47**															
9	Army Life Adjustment	1,012	*.07*	*.06*	*.07*	*.07*	*.07*	*.07*	**.29**	**.51**														
10	Army Fit	1,012	-.02	-.02	-.03	-.05	-.04	-.05	**.44**	**.83**	**.67**													
11	APFT	995	**-.17**	**-.13**	*-.08*	**-.13**	**-.12**	**-.13**	.03	*.06*	**.20**	**.10**												
12	Attrition Cognitions	1,012	.01	-.02	-.01	-.01	-.01	-.01	**-.35**	**-.60**	**-.58**	**-.66**	**-.10**											
13	Career Intentions	1,012	**-.18**	**-.09**	**-.17**	**-.18**	**-.18**	**-.19**	**.39**	**.57**	**.39**	**.52**	**.11**	**-.52**										
14	Disciplinary Actions	1,012	-.01	.05	.03	.04	.04	.04	.01	*-.07*	**-.12**	**-.11**	*-.07*	.04	*-.06*									
15	MOS Fit	1,012	**.29**	**.21**	**.19**	**.22**	**.22**	**.22**	**.17**	**.35**	**.31**	**.39**	**-.11**	**-.28**	*.08*	-.02								
16	Normative Commitment	1,012	.02	*.07*	.06	*.08*	*.07*	*.08*	**.31**	**.65**	**.48**	**.67**	.05	**-.71**	**.46**	-.03	**.28**							
17	Reenlistment Intentions	1,012	**-.15**	*-.08*	**-.15**	**-.16**	**-.15**	**-.16**	**.36**	**.53**	**.37**	**.50**	**.10**	**-.53**	**.86**	*-.07*	.04	**.47**						
18	Training Achievements	1,012	**-.13**	*-.07*	**-.12**	**-.09**	**-.10**	**-.10**	.02	*.08*	**.15**	**.12**	**.30**	**-.10**	**.10**	-.04	.03	.02	*.07*					
19	Training Failures	1,012	**-.11**	*-.07*	**-.09**	**-.13**	**-.12**	**-.12**	.04	*-.07*	**-.18**	**-.11**	**-.25**	**.10**	-.04	**.16**	*-.08*	-.03	-.03	**-.12**				
20	WTBD % Correct	959	**.36**	**.32**	**.44**	**.44**	**.44**	**.45**	*-.08*	.03	**.09**	*.07*	-.02	**-.12**	-.06	.00	**.10**	**.14**	-.04	-.05	*-.06*			
21	PRS Mean	1,091	**.33**	**.22**	**.30**	**.33**	**.33**	**.33**	*-.08*	-.03	**.14**	.04	.02	-.01	**-.10**	**-.11**	**.23**	.01	-.06	.02	**-.12**	**.20**		
22	Final AIT Course Grade	527	**.40**	**.31**	**.39**	**.45**	**.46**	**.46**	**-.28**	*-.15*	-.04	-.09	.01	.09	**-.21**	.03	**.19**	.03	**-.17**	-.02	-.08	**.46**	**.40**	
23	Grad AIT w/o Failure	1,442	**.16**	.05	**.16**	**.15**	**.16**	**.16**	.02	-.01	.06	.03	*.08*	-.05	-.03	**-.11**	.05	-.01	-.03	.01	**-.37**	.04	**.20**	**.33**

Note. For all correlations, bolded values are those where p < 0.01 and italicized values are those where p < 0.05.

Table A5

Correlations among Predictor and Criterion Variables in 25N MOS

#	Variable	*n*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	ICTL	314																						
2	EI	294	**.36**																					
3	AFQT	294	**.38**	**.26**																				
4	EL	294	**.44**	**.66**	**.79**																			
5	SC	294	**.43**	**.64**	**.83**	**.99**																		
6	ST	294	**.44**	**.56**	**.87**	**.98**	**.99**																	
7	Army Civ. Comparison	151	-.13	-.14	.02	-.14	-.12	-.11																
8	Affective Commitment	153	-.05	-.11	-.01	-.15	-.13	-.11	**.52**															
9	Army Life Adjustment	153	-.14	*-.19*	.02	-.12	-.10	-.09	**.22**	**.58**														
10	Army Fit	153	-.06	-.16	.03	-.12	-.10	-.09	**.42**	**.85**	**.71**													
11	APFT	153	*-.20*	*-.20*	-.03	-.14	-.11	-.12	-.03	.08	**.26**	.13												
12	Attrition Cognitions	153	.16	.16	-.04	.10	.08	.07	**-.39**	**-.68**	**-.61**	**-.72**	*-.17*											
13	Career Intentions	153	-.11	-.06	*-.20*	*-.19*	*-.19*	*-.19*	**.33**	**.54**	**.38**	**.46**	.02	**-.43**										
14	Disciplinary Actions	153	-.02	.01	-.03	-.05	-.06	-.05	.00	*-.16*	**-.25**	*-.19*	**-.22**	**.28**	*-.18*									
15	MOS Fit	153	*.16*	.06	.05	.00	.01	.01	**.43**	**.39**	**.24**	**.34**	-.10	**-.27**	.14	.04								
16	Normative Commitment	153	-.10	-.11	.07	-.03	-.01	.00	**.46**	**.74**	**.54**	**.75**	-.03	**-.82**	**.47**	**-.27**	**.33**							
17	Reenlistment Intentions	153	*-.19*	-.10	-.15	*-.18*	*-.18*	*-.18*	**.34**	**.52**	**.45**	**.50**	.04	**-.47**	**.85**	-.15	.11	**.48**						
18	Training Achievements	153	*-.20*	-.12	**-.31**	**-.24**	**-.24**	**-.26**	-.05	-.02	.06	-.01	**.32**	-.09	.08	-.04	-.11	.00	.13					
19	Training Failures	153	.16	**.23**	.08	.12	.12	.11	.05	-.02	*-.20*	-.12	**-.34**	*.20*	-.12	**.26**	.15	-.08	-.14	**-.32**				
20	WTBD % Correct	146	*.18*	.05	*.18*	.13	.13	.13	.03	.06	*.18*	.12	-.08	.01	-.08	.11	.13	.10	-.07	-.05	.07			
21	PRS Mean	169	.14	.12	.03	.08	.09	.07	-.16	-.07	.08	.00	*.19*	-.07	-.10	*-.18*	.06	.03	-.14	*.19*	-.12	.09		
22	Final AIT Course Grade	159	**.46**	**.26**	**.45**	**.45**	**.47**	**.47**	-.14	-.11	.11	-.03	.18	-.08	-.15	-.20	-.07	.00	-.15	.00	-.14	*.27*	**.42**	
23	Grad AIT w/o Failure	229	.08	.04	.11	.08	.10	.10	**.38**	*.23*	*.22*	**.30**	*.21*	**-.37**	.13	*-.24*	.13	**.32**	.16	.14	*-.20*	.07	.05	**.24**

Note. For all correlations, bolded values are those where p < 0.01 and italicized values are those where p < 0.05.

Table A6

Gender Subgroup Means, Standard Deviations, and Standardized Group Mean Differences (Cohen's d) among Predictor Variables in 25B and 25N MOS

	25B					25N				
	Female		Male			Female		Male		
Measure	*M*	*SD*	*M*	*SD*	*d*	*M*	*SD*	*M*	*SD*	*d*
ICTL Scaled Score	51.96	6.38	56.12	8.28	**-0.52**	57.97	7.69	60.52	7.57	-0.34
ASVAB: EI Subtest	46.65	6.55	53.39	8.34	**-0.84**	52.38	5.34	57.24	7.18	**-0.70**
ASVAB: Skilled-Technical Composite	102.46	7.36	108.96	11.18	**-0.62**	112.23	7.18	116.02	8.73	**-0.44**
ASVAB: Electrical Composite	100.55	7.54	108.38	11.63	**-0.72**	110.82	7.26	115.68	8.90	**-0.56**
ASVAB: Surveillance and Communication Composite	102.34	7.49	109.18	11.29	**-0.65**	112.36	6.96	116.33	8.69	**-0.47**

Note. The minority group is the referent group for the comparisons. For 25B, subgroup sample size is 1,371 and 359 for Males and Females, respectively. For 25N, subgroup sample size is 254 and 39 for Males and Females, respectively. Significant mean differences, based on an independent sample *t*-test between the group means, are denoted by a *d* value in bold typeface ($p < .05$, two-tailed).

Table A7

Racial/Ethnic Subgroup Means, Standard Deviations, and Standardized Group Mean Differences (Cohen's d) among Predictor Variables in 25B and 25N MOS

	White		Black			Hispanic		
MOS / Measure	*M*	*SD*	*M*	*SD*	*d*	*M*	*SD*	*d*
25B								
ICTL Scaled Score	57.43	8.35	52.52	7.05	**-0.62**	53.98	7.38	**-0.42**
ASVAB: EI Subtest	54.89	7.92	48.85	7.66	**-0.77**	50.97	8.19	**-0.49**
ASVAB: Skilled-Technical Composite	111.98	11.50	102.76	7.56	**-0.91**	104.61	8.86	**-0.67**
ASVAB: Electrical Composite	111.51	11.92	101.41	7.97	**-0.96**	103.86	9.29	**-0.67**
ASVAB: Surveillance and Communication Composite	112.08	11.65	102.91	7.74	**-0.89**	104.96	9.03	**-0.64**
25N								
ICTL Scaled Score	61.01	7.69	57.00	7.52	**-0.53**	59.57	6.84	-0.19
ASVAB: EI Subtest	57.57	6.74	54.53	7.50	**-0.44**	54.78	6.91	**-0.41**
ASVAB: Skilled-Technical Composite	117.66	8.87	111.27	6.65	**-0.77**	112.43	7.23	**-0.61**
ASVAB: Electrical Composite	117.26	8.98	110.61	6.93	**-0.79**	111.68	7.36	**-0.64**
ASVAB: Surveillance and Communication Composite	117.77	8.90	111.82	6.50	**-0.72**	112.89	7.13	**-0.57**

Note. The minority group is the referent group for the comparisons. For 25B, subgroup sample sizes are 522, 247, and 803 for Blacks, Hispanics, and Whites, respectively. For 25N, subgroup sample sizes are 62, 37, and 164 for Blacks, Hispanics, and Whites, respectively. Significant mean differences, based on an independent sample *t*-test between the group means, are denoted by a *d* value in bold typeface ($p < .05$, two-tailed).

Table A8

Gender Subgroup Means, Standard Deviations, and Standardized Group Mean Differences (Cohen's d) among Criterion Variables in 25B and 25N MOS

	25B					25N				
	Female		Male			Female		Male		
Measure	*M*	*SD*	*M*	*SD*	*d*	*M*	*SD*	*M*	*SD*	*d*
Final AIT course grade	81.00	9.20	81.95	9.76	-0.10	91.41	4.88	92.55	5.05	-0.23
AIT graduation status	0.87	0.34	0.86	0.35	0.05	0.97	0.19	0.90	0.30	0.23
Peer performance rating scales (PRS)	3.78	0.75	4.03	0.79	**-0.32**	3.91	0.85	4.03	0.59	-0.19
MOS fit	3.51	0.80	3.94	0.74	**-0.57**	3.09	1.17	3.63	0.78	**-0.64**

Note. The minority group is the referent group for the comparisons. For 25B, sample sizes for Males range from 413 to 1,132; Females from 111 to 303. For 25N, sample sizes for Males range from 125 to 199; Females from 18 to 29. Significant mean differences, based on an independent sample *t*-test between the group means, are denoted by a *d* value in bold typeface ($p < .05$, two-tailed).

Table A9

Racial/Ethnic Subgroup Means, Standard Deviations, and Standardized Group Mean Differences (Cohen's d) among Criterion Variables in 25B and 25N MOS

	White		Black			Hispanic		
MOS / Measure	*M*	*SD*	*M*	*SD*	*d*	*M*	*SD*	*d*
25B								
Final AIT course grade	83.36	9.07	78.95	10.49	**-0.46**	81.80	7.60	-0.18
AIT graduation status	0.88	0.33	0.82	0.39	**-0.16**	0.86	0.34	-0.04
Peer performance rating scales (PRS)	4.08	0.77	3.84	0.82	**-0.30**	3.90	0.76	**-0.23**
MOS fit	3.94	0.80	3.78	0.72	**-0.21**	3.81	0.71	-0.17
25N								
Final AIT course grade	92.76	4.94	90.45	5.75	**-0.45**	93.53	2.89	0.16
AIT graduation status	0.91	0.29	0.94	0.24	0.11	0.90	0.31	-0.04
Peer performance rating scales (PRS)	3.97	0.65	4.09	0.69	0.18	3.98	0.47	0.01
MOS fit	3.42	0.90	3.95	0.60	**0.65**	3.29	0.92	-0.14

Note. The minority group is the referent group for the comparisons. For 25B, sample sizes for White, Non-Hispanics range from 245 to 642; Blacks from 157 to 442; Hispanics from 71 to 219. For 25N, sample sizes for White, Non-Hispanics range from 82 to 130; Blacks from 27 to 48; Hispanics from 17 to 29. Significant mean differences, based on an independent sample *t*-test between the group means, are denoted by a *d* value in bold typeface ($p < .05$, two-tailed).

Table A10

Gender Subgroup Pass Rates and Adverse Impact Statistics for Various Cutoffs on the ICTL Test in 25B and 25N MOS

	25B				25N			
Measure / Cutoff	Female *PR*	Male *PR*	*AIR*	*FET*	Female *PR*	Male *PR*	*AIR*	*FET*
ICTL Scaled Score								
50th Percentile	28.4%	50.8%	.56	**.00**	41.0%	51.2%	.80	.30
55th Percentile	24.5%	46.5%	.53	**.00**	35.9%	44.5%	.81	.39
60th Percentile	19.5%	41.6%	.47	**.00**	33.3%	40.9%	.81	.39
65th Percentile	15.0%	37.3%	.40	**.00**	23.1%	35.8%	.64	.15
70th Percentile	12.0%	34.1%	.35	**.00**	17.9%	32.7%	.55	.09

Note. *PR* = Pass rate; *AIR* = adverse impact ratio; *FET* = Fisher's exact test. The minority group is the referent group for the comparisons. For 25B, Male sample size is 1,371; female sample size is 359. For 25N, Male sample size is 254; female sample size is 39. Fisher's exact test values < 0.05 highlighted in bold typeface.

Table A11

Racial/Ethnic Subgroup Pass Rates and Adverse Impact Statistics for Various Cutoffs on the ICTL Test in 25B and 25N MOS

	25B							25N						
Measure / Cutoff	White *PR*	Black *PR*	*AIR*	*FET*	Hisp *PR*	*AIR*	*FET*	White *PR*	Black *PR*	*AIR*	*FET*	Hisp *PR*	*AIR*	*FET*
ICTL Scaled Score														
50th Percentile	57.5%	32.0%	.56	**.00**	40.5%	.70	**.00**	53.7%	33.9%	.63	**.01**	40.5%	.76	.20
55th Percentile	53.7%	27.4%	.51	**.00**	35.6%	.66	**.00**	48.2%	24.2%	.50	**.00**	37.8%	.79	.28
60th Percentile	48.6%	22.2%	.46	**.00**	31.2%	.64	**.00**	45.7%	19.4%	.42	**.00**	32.4%	.71	.15
65th Percentile	44.0%	18.2%	.41	**.00**	28.7%	.65	**.00**	39.0%	17.7%	.45	**.00**	24.3%	.62	.13
70th Percentile	41.0%	15.5%	.38	**.00**	23.5%	.57	**.00**	35.4%	12.9%	.36	**.00**	24.3%	.69	.25

Note. PR = Pass rate; *AIR* = adverse impact ratio; *FET* = Fisher's exact test. The minority group is the referent group for the comparisons. For 25B, White sample size is 803; Black sample size is 522; Hispanic sample size is 247. For 25N, White sample size is 164; Black sample size is 62; Hispanic sample size is 37. Fisher's exact test values < 0.05 highlighted in bold typeface.

Table A12

Gender Subgroup Criterion-related Validity Estimates and Moderated Multiple Regression Results for Differential Prediction Analyses

	Correlations				Moderated Multiple Regression							
	Male		Female		Uncorrected				Corrected			
Criterion / Predictor	*r*	r_{RRC}	*r*	r_{RRC}	Int	X	Grp	X*Grp	Int	X	Grp	X*Grp
Final AIT course grade												
ICTL Scaled Score	**.433**	.501	**.276**	.426	**81.38**	**0.51**	0.86	-0.12	80.99	0.57	0.57	-0.01
ASVAB: EI Subtest	***.357***	.411	*.100*	.309	**81.39**	**0.41**	0.30	**-0.28**	79.66	0.47	1.20	-0.08
ASVAB: Skilled-Technical Composite	***.490***	.562	***.282***	.486	**81.44**	**0.41**	0.83	-0.08	81.46	0.39	1.04	-0.03
ASVAB: Electrical Composite	***.486***	.557	***.287***	.483	**81.33**	**0.39**	1.30	-0.07	81.15	0.38	1.62	-0.02
ASVAB: Surveillance and Communication Composite	***.495***	.567	***.293***	.487	**81.41**	**0.41**	0.99	-0.08	81.47	0.39	1.14	-0.03
AIT graduation status												
ICTL Scaled Score	**.174**	.226	**.126**	.227	**0.85**	**0.01**	0.04	0.00	0.83	0.01	0.04	0.00
ASVAB: EI Subtest	**.068**	.129	.008	.115	**0.85**	**0.00**	0.02	0.00	0.82	0.01	0.03	0.00
ASVAB: Skilled-Technical Composite	**.174**	.235	**.137**	.271	**0.85**	**0.01**	**0.06**	0.00	0.84	0.01	0.06	0.00
ASVAB: Electrical Composite	**.172**	.235	**.127**	.263	**0.85**	**0.01**	**0.06**	0.00	0.84	0.01	0.06	0.00
ASVAB: Surveillance and Communication Composite	**.177**	.240	**.142**	.274	**0.85**	**0.01**	**0.06**	0.00	0.84	0.01	0.06	0.00
Peer performance rating scales (PRS)												
ICTL Scaled Score	**.325**	.408	**.232**	.302	**3.98**	**0.03**	-0.12	0.00	3.94	0.04	-0.07	-0.01
ASVAB: EI Subtest	***.222***	.306	*.011*	.131	**4.00**	**0.02**	**-0.20**	**-0.02**	3.86	0.03	-0.07	-0.01
ASVAB: Skilled-Technical Composite	***.342***	.438	*.133*	.253	**3.99**	**0.02**	-0.13	-0.01	3.97	0.02	-0.10	-0.01
ASVAB: Electrical Composite	***.337***	.433	*.124*	.248	**3.98**	**0.02**	-0.12	-0.01	3.95	0.02	-0.07	-0.01
ASVAB: Surveillance and Communication Composite	***.344***	.440	*.115*	.244	**3.99**	**0.02**	**-0.14**	-0.01	3.97	0.02	-0.10	-0.01

(continued)

Table A12 (continued)

Gender Subgroup Criterion-related Validity Estimates and Moderated Multiple Regression Results for Differential Prediction Analyses

	Correlations				Moderated Multiple Regression							
	Male		Female		Uncorrected				Corrected			
Criterion / Predictor	*r*	r_{RRC}	*r*	r_{RRC}	Int	X	Grp	X*Grp	Int	X	Grp	X*Grp
MOS fit												
ICTL Scaled Score	**.263**	.301	**.226**	.337	**3.90**	**0.02**	**-0.30**	0.00	3.90	0.02	-0.29	0.01
ASVAB: EI Subtest	**.157**	.200	**.180**	.290	**3.91**	**0.01**	**-0.28**	0.01	3.84	0.02	-0.25	0.01
ASVAB: Skilled-Technical Composite	**.182**	.237	**.174**	.323	**3.91**	**0.01**	**-0.31**	0.01	3.90	0.01	-0.27	0.01
ASVAB: Electrical Composite	**.178**	.233	**.201**	.333	**3.91**	**0.01**	**-0.27**	0.01	3.89	0.01	-0.23	0.01
ASVAB: Surveillance and Communication Composite	**.183**	.236	**.188**	.325	**3.91**	**0.01**	**-0.30**	0.01	3.90	0.01	-0.26	0.01

Note. Uncorrected estimates based on the validation sample; corrected estimates based on range restriction corrections as explained in text. Moderated multiple regression results are unstandardized coefficients for a model that includes the focal predictor measure (X), demographic group variable (Grp; coded as 0 = Majority, 1 = Minority), and the interaction between the focal predictor and the demographic group variable (X*Grp). Sample sizes for Males range from 413 to 1,132; for Females, from 111 to 303. For all tabled values, bolded values are those where $p < 0.05$. Italicized correlations are those where the difference between the Majority and Minority estimates is significant at two-tailed $p < 0.05$.

Table A13

Racial/Ethnic (Hispanic/White) Subgroup Criterion-related Validity Estimates and Moderated Multiple Regression Results for Differential Prediction Analyses

	Correlations				Moderated Multiple Regression							
	White		Hispanic		Uncorrected				Corrected			
Criterion / Predictor	*r*	r_{RRC}	*r*	r_{RRC}	Int	X	Grp	X*Grp	Int	X	Grp	X*Grp
Final AIT course grade												
ICTL Scaled Score	**.415**	.464	**.288**	.357	**82.23**	**0.45**	-0.15	-0.17	81.72	0.50	0.07	-0.17
ASVAB: EI Subtest	***.342***	.370	*.077*	.173	**82.33**	**0.37**	-0.50	**-0.30**	80.60	0.42	0.23	-0.27
ASVAB: Skilled-Technical Composite	***.520***	.571	***.277***	.346	**81.59**	**0.39**	0.76	-0.18	81.73	0.38	0.63	-0.17
ASVAB: Electrical Composite	***.511***	.561	***.263***	.339	**81.53**	**0.37**	0.75	-0.17	81.42	0.37	0.83	-0.17
ASVAB: Surveillance and Communication Composite	***.517***	.570	***.271***	.346	**81.66**	**0.38**	0.62	-0.17	81.77	0.38	0.57	-0.17
AIT graduation status												
ICTL Scaled Score	**.142**	.167	.099	.094	**0.86**	**0.01**	0.01	0.00	0.85	0.01	0.01	0.00
ASVAB: EI Subtest	.075	.094	-.024	.003	**0.87**	0.00	0.00	0.00	0.84	0.00	0.01	0.00
ASVAB: Skilled-Technical Composite	***.190***	.216	*.034*	.035	**0.85**	**0.01**	0.01	0.00	0.85	0.01	0.00	0.00
ASVAB: Electrical Composite	***.185***	.212	*.032*	.038	**0.85**	**0.01**	0.01	0.00	0.85	0.00	0.01	0.00
ASVAB: Surveillance and Communication Composite	**.189**	.217	.042	.043	**0.85**	**0.01**	0.01	0.00	0.85	0.01	0.01	0.00
Peer performance rating scales (PRS)												
ICTL Scaled Score	**.340**	.398	**.262**	.313	**3.98**	**0.03**	-0.06	0.00	3.96	0.04	-0.05	0.00
ASVAB: EI Subtest	**.235**	.273	.120	.188	**4.01**	**0.02**	-0.09	-0.01	3.89	0.03	-0.06	-0.01
ASVAB: Skilled-Technical Composite	**.357**	.423	**.221**	.275	**3.96**	**0.02**	0.00	0.00	3.96	0.02	-0.02	-0.01
ASVAB: Electrical Composite	**.349**	.413	**.238**	.292	**3.96**	**0.02**	0.00	0.00	3.94	0.02	0.00	-0.01
ASVAB: Surveillance and Communication Composite	**.354**	.420	**.229**	.281	**3.97**	**0.02**	-0.01	0.00	3.97	0.02	-0.02	-0.01

(continued)

Table A13 (continued)

Racial/Ethnic (Hispanic/White) Subgroup Criterion-related Validity Estimates and Moderated Multiple Regression Results for Differential Prediction Analyses

	Correlations				Moderated Multiple Regression							
	White		Hispanic		Uncorrected				Corrected			
Criterion / Predictor	*r*	r_{RRC}	*r*	r_{RRC}	Int	X	Grp	X*Grp	Int	X	Grp	X*Grp
MOS fit												
ICTL Scaled Score	***.338***	.370	*.147*	.158	**3.85**	**0.03**	-0.03	-0.02	3.84	0.03	0.00	-0.02
ASVAB: EI Subtest	***.258***	.295	*.057*	.074	**3.86**	**0.03**	-0.05	**-0.02**	3.77	0.03	0.04	-0.02
ASVAB: Skilled-Technical Composite	***.266***	.308	*.020*	.068	**3.85**	**0.02**	-0.04	**-0.02**	3.85	0.02	-0.03	-0.01
ASVAB: Electrical Composite	***.270***	.314	*.016*	.057	**3.84**	**0.02**	-0.03	**-0.02**	3.83	0.02	-0.02	-0.01
ASVAB: Surveillance and Communication Composite	***.264***	.306	*.024*	.065	**3.85**	**0.02**	-0.04	**-0.02**	3.85	0.02	-0.03	-0.01

Note. Uncorrected estimates based on the validation sample; corrected estimates based on range restriction corrections as explained in text. Moderated multiple regression results are unstandardized coefficients for a model that includes the focal predictor measure (X), demographic group variable (Grp; coded as 0 = Majority, 1 = Minority), and the interaction between the focal predictor and the demographic group variable (X*Grp). Sample sizes for Whites range from 245 to 642; for Hispanics, from 71 to 219. For all tabled values, bolded values are those where $p < 0.05$. Italicized correlations are those where the difference between the Majority and Minority estimates is significant at two-tailed $p < 0.05$.

Table A14

Racial/Ethnic (Black/White) Subgroup Criterion-related Validity Estimates and Moderated Multiple Regression Results for Differential Prediction Analyses

	Correlations				Moderated Multiple Regression							
	White		Black		Uncorrected				Corrected			
Criterion / Predictor	*r*	r_{RRC}	*r*	r_{RRC}	Int	X	Grp	X*Grp	Int	X	Grp	X*Grp
Final AIT course grade												
ICTL Scaled Score	**.415**	.464	**.319**	.462	**82.23**	**0.45**	-1.92	0.06	81.72	0.50	-2.68	0.24
ASVAB: EI Subtest	**.342**	.370	**.224**	.389	**82.33**	**0.37**	**-2.37**	-0.05	80.60	0.42	-3.40	0.14
ASVAB: Skilled-Technical Composite	**.520**	.571	**.365**	.560	**81.59**	**0.39**	-0.26	0.12	81.73	0.38	-0.33	0.15
ASVAB: Electrical Composite	**.511**	.561	**.360**	.556	**81.53**	**0.37**	-0.14	0.11	81.42	0.37	0.05	0.15
ASVAB: Surveillance and Communication Composite	**.517**	.570	**.390**	.574	**81.66**	**0.38**	-0.23	0.15	81.77	0.38	-0.24	0.16
AIT graduation status												
ICTL Scaled Score	**.142**	.167	**.210**	.298	**0.86**	**0.01**	-0.01	**0.01**	0.85	0.01	-0.02	0.01
ASVAB: EI Subtest	.075	.094	-.001	.108	**0.87**	0.00	**-0.05**	0.00	0.84	0.00	-0.08	0.00
ASVAB: Skilled-Technical Composite	**.190**	.216	**.144**	.283	**0.85**	**0.01**	0.00	0.00	0.85	0.01	0.01	0.00
ASVAB: Electrical Composite	**.185**	.212	**.137**	.278	**0.85**	**0.01**	0.00	0.00	0.85	0.00	0.01	0.00
ASVAB: Surveillance and Communication Composite	**.189**	.217	**.148**	.287	**0.85**	**0.01**	0.00	0.00	0.85	0.01	0.01	0.00
Peer performance rating scales (PRS)												
ICTL Scaled Score	**.340**	.398	**.227**	.334	**3.98**	**0.03**	-0.09	-0.01	3.96	0.04	-0.12	0.00
ASVAB: EI Subtest	**.235**	.273	.102	.208	**4.01**	**0.02**	**-0.14**	-0.01	3.89	0.03	-0.17	0.00
ASVAB: Skilled-Technical Composite	***.357***	.423	***.210***	.351	**3.96**	**0.02**	-0.03	0.00	3.96	0.02	-0.03	0.00
ASVAB: Electrical Composite	***.349***	.413	***.200***	.344	**3.96**	**0.02**	-0.03	0.00	3.94	0.02	-0.01	0.00
ASVAB: Surveillance and Communication Composite	***.354***	.420	***.204***	.348	**3.97**	**0.02**	-0.04	0.00	3.97	0.02	-0.03	0.00

(continued)

Table A14 (continued)

Racial/Ethnic (Black/White) Subgroup Criterion-related Validity Estimates and Moderated Multiple Regression Results for Differential Prediction Analyses

	Correlations				Moderated Multiple Regression							
	White		Black		Uncorrected				Corrected			
Criterion / Predictor	*r*	r_{RRC}	*r*	r_{RRC}	Int	X	Grp	X*Grp	Int	X	Grp	X*Grp
MOS fit												
ICTL Scaled Score	**.338**	.370	**.208**	.268	**3.85**	**0.03**	-0.03	-0.01	3.84	0.03	-0.06	-0.01
ASVAB: EI Subtest	**.258**	.295	**.138**	.195	**3.86**	**0.03**	-0.05	-0.01	3.77	0.03	-0.04	-0.01
ASVAB: Skilled-Technical Composite	**.266**	.308	**.136**	.228	**3.85**	**0.02**	-0.01	-0.01	3.85	0.02	-0.04	0.00
ASVAB: Electrical Composite	**.270**	.314	**.148**	.236	**3.84**	**0.02**	0.00	-0.01	3.83	0.02	-0.01	0.00
ASVAB: Surveillance and Communication Composite	**.264**	.306	**.156**	.241	**3.85**	**0.02**	-0.01	0.00	3.85	0.02	-0.03	0.00

Note. Uncorrected estimates based on the validation sample; corrected estimates based on range restriction corrections as explained in text. Moderated multiple regression results are unstandardized coefficients for a model that includes the focal predictor measure (X), demographic group variable (Grp; coded as 0 = Majority, 1 = Minority), and the interaction between the focal predictor and the demographic group variable (X*Grp). Sample sizes for Whites range from 245 to 642; for Blacks, from 157 to 442. For all tabled values, bolded values are those where $p < 0.05$. Italicized correlations are those where the difference between the Majority and Minority estimates is significant at two-tailed $p < 0.05$.