

Validation of a Trooper Selection System: Project Technical Report

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This report describes the procedures followed in the development of a new selection system for troopers of the North Carolina State Highway Patrol. It begins with a discussion of the general approach taken in this project (see below) and a section on how to find information in this report (see page 2). It continues with four sections which describe the details of the project. Section 1 describes oversight of the project (see page 3). Section 2 describes criterion and predictor development (see page 4). Section 3 describes the concurrent validation study (see page 6). Section 4 describes the new selection system for troopers and this reports compliance with the documentation requirements in the Uniform Guidelines (see page 11). This report concludes with some observations on the current state of selection in law enforcement, some recommendations for future research, and acknowledgements (see page 14). An index of key terms and a brief discussion of revisions (see page 15) is provided immediately following the reference section (see page 15).

Statement of Approach

The ideas and procedures presented in this report are governed by a central philosophy that is important to understand. One component of this philosophy is that changing how people are selected is best approached from a systems perspective. A second component is that action research methodology involving key decision makers, those who will be affected by any changes, and technical experts will have the best chance of leading to successful change. What follows is a brief discussion of a systems perspective, action research methodology, and a listing of tables, figures, and appendices in this report.

A Systems Perspective

Rather than simply improving selection our goal was to upgrade several key elements of the human resource system at the North Carolina State Highway Patrol (NCSHP). What does that mean? The management of human resources is essentially a series of decisions about people and work. These decisions are supported by an interrelated set of activities that are designed and administered in order to make more effective and efficient decisions. Common human resource activities include, staff planning, job analysis, recruitment, selection, training, performance measurement, promotion, and compensation. Taken together these activities are called the Human Resource System.

The term "system" implies three important characteristics of human resource activities. First, the individual activities (e.g.,

job analysis, training, promotion) are interdependent. Interdependence means that the successful completion of any one activity is dependent upon the successful completion of one or more of the other activities. For example, a selection process is dependent on a comprehensive job analysis, accurate predictor and performance measurement, and good recruiting at a minimum in order to be successful. Second, the activities exist within an environment that may require change to maintain effectiveness and efficiency. Successful human resource systems monitor the environment and respond to change. For example, human resource systems should be periodically reviewed in the light of new technical information about procedures and regulatory changes in human resource practices (e.g., Americans with Disabilities Act). Third, the system produces outcomes or results and can be used to evaluate the success of the system. Good human resource systems result in better worker performance, lower turnover, and more committed workers.

The implications of taking a systems approach for this project is that previous activities such as job analysis and performance measurement were designed with the needs of several other human resource activities in mind (e.g., trooper selection and training) using one set of work dimensions common to all activities. The content of the new trooper selection system has been directly tied to appropriate job analysis and performance data. Further, job analysis and performance measurement were designed to be flexible and to detect changes in the work and work environment. Finally, changes in trooper selection were evaluated not only in terms of efficiency but also their effectiveness in obtaining desired and relevant outcomes.

Action Research Method

How to Find Information in this Report

The results of this project were not predetermined. All decisions were based on information and data collected during the project. Important decision points along with recommendations and options were provided by consulting people both in and outside of the organization. This project was not something done for NCSHP as much as something done with NCSHP. Using the best available technical and subject matter experts, information was collected, analyzed, and presented to NCSHP management as the basis for making decisions about trooper selection systems.

Technical reports are often very large and full of many tables, figures, and appendices. The sense of information overload can be frustrating when the reader is searching for specific information. In order to make this report as useful as possible the reader has been provided with three aids in finding information. If you are looking for a particular project document or result, Table 1 provides a complete listing of all tables, figures, and appendices found in this report. If you are looking for information on when an event occurred or where a particular step in the project is discussed in this report, Appendix A provides a listing of each step in the project, where the step is discussed in the report, and beginning and ending dates for each step. If you are looking for where a particular topic is addressed in the report, the Index of Key Terms beginning on page 15 provides a listing of major topics and where they are discussed in the report.

The implications of using action research methodology are that recommendations and evaluations were “data driven” while taking into account the unique needs of NCSHP. Rather than relying solely on expert judgment or management preferences, the success or failure of the new system will be based on measurable outcomes developed as a result of this project.

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Section 1: Project Consultations and Reviews

An important step in the development of a new selection system for troopers included a series of reviews and consultations. A number of steps were taken in order to maintain technical standards, identify best practices, and insure better implementation of project activities and recommendations. These steps involved forming an internal advisory board, a project management team, an external technical advisory board, meeting with the United States Department of Justice, and hosting a national summit meeting for state police and highway patrol organizations. Figure 1 provides an illustration of the consultation and review process.

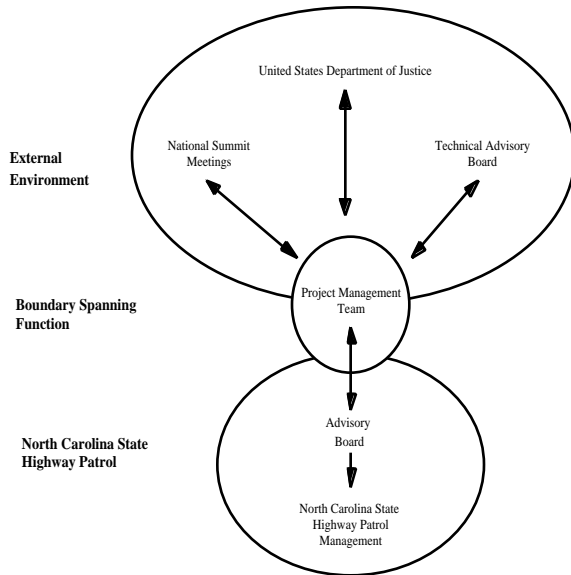


Figure 1. Consultations and Reviews

Advisory Board

The subject matter advisory board (AB) was composed of 9 Troopers with one Trooper being drawn from each of the 9 troops. The board was appointed by NCSHP Management. Appendix B provides a list of the AB members and their troop affiliations. The AB provided subject matter expertise and helped formulate recommendations concerning procedure and policy for NCSHP Management. No significant action in the project was taken without the review and approval of the board. The board also represented the diversity of the NCSHP in terms of gender and race. Accepting membership on the board was considered a commitment not only to help in completing the entire project but also to explain the project to coworkers. The AB met a total of five times and reviewed every aspect of the project.

Project Management Team

The project management team consisted of three members. Major George S. Ake, Director of Research and Planning, NCSHP, managed the project on behalf of the NCSHP. Dr.

Mark A. Wilson, Associate Professor of Psychology, Area Coordinator of Industrial and Organizational Psychology, North Carolina State University (NCSU), served as Principal Investigator and managed the project on behalf of NCSU. Dr. Lisa D. Grant, Industrial and Organizational Psychologist¹, NCSHP, served as co-Principal Investigator and day-to-day manager of the project. Project management team members planned and coordinated all project activities and served in a boundary role spanning function between external sources of information and the NCSHP.

Technical Advisory Board

The Technical Advisory Board (TAB), composed of recognized experts in the field of job analysis, training and selection, reviewed project procedures and the technical report for this project. Appendix C provides a list of TAB members and their organizational affiliations. While final decisions concerning technical matters rested with the first author, great deference was paid to the suggestions of TAB members. The TAB also served as a sounding board for potential technical innovations and as an additional source of expertise in the event the results of this project are challenged. The first duty of the TAB was to review the entire research proposal pointing out options and potential refinements in procedure. A copy of their comments on the proposal are presented in Appendix D. The final duty of the TAB was to review this technical report. A copy of their comments on the technical report are presented in Appendix E.

United States Department of Justice

One goal of the project was to develop a new hiring system prior to ending a consent decree. The project management team along with Mr. Isaac T. Avery, III, Special Deputy Attorney General, State of North Carolina, have met with several members of the United States Department of Justice (DOJ), Civil Rights Division, on a number of occasions during the project. The purpose of these meetings was to brief the DOJ on project plans and activities, obtain information on similar projects where the DOJ was involved, and to obtain advice on potential project activities.

National Summit Meeting

As a “real world” complement to the TAB and AB, the NCSHP hosted the second Summit on Promotion and Hiring Procedures of State Police and Highway Patrol Organizations on September 3-5, 1996. The purpose of this summit was to bring those responsible for promotion and hiring from the 49 counterparts of the NCSHP together and provide a forum for discussion of what seems to be working and what needs improvement with regard to ¹This was a new position created as a part of this project on 9/1/96. The Principal Investigator assisted in the job design and selection process in partial fulfillment of the requirements specified in Research Proposal Number: 96-1147 NCSU.

hiring and promotion. The goal of the summit was to provide “hands on” experiences and identify innovations. An important aspect of the summit is that it was composed solely of the practitioners from each of the counterpart organizations. Thirty-one states were represented at the 1996 summit. Appendix F is a copy of the agenda from the summit.

Section 2: Criterion and Predictor Development

The creation of a new selection system for troopers involved development of criteria and predictors of performance. The first step in the development process was a review of a recent trooper job analysis that was completed as part of a previous project. The next step was to study training, supervisory ratings, and field activity of troopers in order to identify important job performance criteria. Criterion development led to the identification of potential predictors and the proposed model of trooper performance.

Job Analysis

This project was fortunate to have a recently completed and comprehensive job analysis for the position of trooper. The complete details of the job analysis have been documented in a previous report (Wilson, Grant, Freund, & Levine, 1995). Figure 2 provides a graphic illustration of the types of job information that were collected and the sources of the information that were used in this project. All incumbents were given the opportunity to complete a job description survey (return rate = 94.9%, N = 1181). Troopers were also interviewed and observed performing their jobs by trained analysts, and the analysts completed a structured job analysis survey based on their interviews and observations. As part of this project, the basic school was observed, and a reading analysis of the school materials was completed. The results of the basic school observations and analysis are discussed in the next section. Taken together, this information was used for identifying important criterion measures and identifying potential predictors.

Training

An extensive amount of training intervenes between the initial

hiring of a cadet and placing a trooper on the road alone. This involves both off site training (basic school) and a field training program (FTO). In order to determine training performance criteria it was important to observe all aspects of training, conduct an analysis of the reading materials in basic school, and conduct exit interviews of those who chose to leave the training.

Six months of intensive training in the basic school intervenes between the initial hiring of a cadet and the swearing in of a trooper. Successful completion of the basic school is a necessary but not sufficient condition of becoming a successful trooper. Observation of the 95th and 96th basic schools of the NCSHP enabled linkage of basic school content to trooper job task analysis results. Appendix G is a copy of a job task/basic school content overlap matrix that resulted from the basic school observations. This matrix was created by observing each aspect of basic school training and categorizing it into the trooper task dimensions obtained from the recent job analysis. The content overlap matrix suggests that basic school training closely matches and taps into all trooper task dimensions. Linkage of the basic school content to the trooper job task analysis results was necessary to establish that the content to the basic school training program adequately reflects the content of the trooper job. This process helped determine that training performance measurements can be used as one of the criterion sets in the validation of a trooper selection system.

Successful cadets in the basic school are required to read and comprehend large amounts of information. All reading materials from the basic school were subjected to a reading level analysis by an expert in order to determine the reading level demands placed on a cadet. Appendix H is a copy of the report on the reading level analysis of the basic school. The results of the reading analysis indicated that the overall average grade level of training materials in the basic school was at the second year of college (13.4). Grade level of the training materials varied from a low of 7.4 to a high of 23.6.

Approximately 33% of the entering class of recent basic schools have chosen to leave the basic school prior to graduation. All members of the 95th and 96th basic schools who withdrew were given the opportunity to be interviewed. Their responses

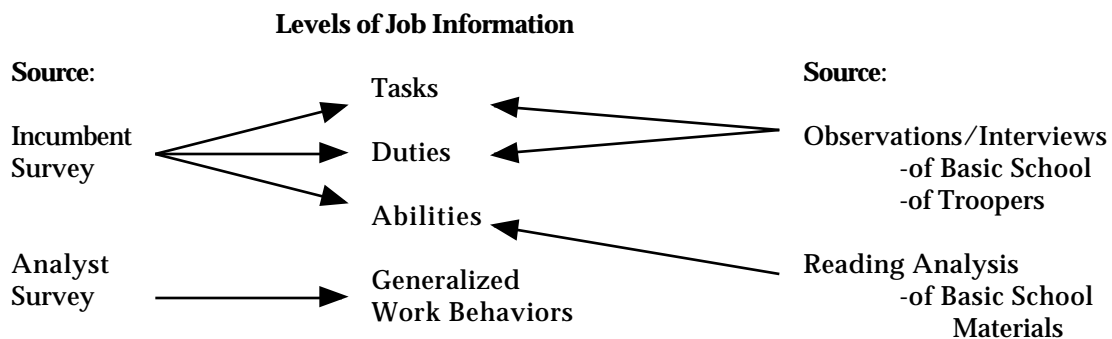


Figure 2. Source and Level of Job Information

were compared to a representative sample of cadets who finished the two schools. Identification of the reasons for withdrawal from the basic school provides important information to determine whether cadets who leave basic school differ from those who stay. Appendix I provides a copy of the structured exit interview and the results from the interviews. Two conclusions drawn from the exit interviews. First, the most common reason for leaving the basic school were external circumstances (e.g., family illness) followed by physical reasons (e.g., injury, lack of physical conditioning). Second, there were few differences between those who left and those who stayed.

Six months of intensive field training in the FTO Program is the final step in a troopers training. Successful completion of the FTO Program is a necessary but not sufficient condition of becoming a successful trooper. Observation of the FTO Program enabled linkage of the program content to Trooper job task analysis results. This process helped determine that field activity measurements could be used as one of the criterion sets in the validation of a Trooper selection system. The conclusion drawn from the observations was that FTO activities closely match all trooper task dimensions identified in the job analysis.

Table 2
List of Activity and Training Course Data

Criterion	Type
Training Course Data	
Elements of Criminal Law	Test
Driver Education*	Test
Law Enforcement Driver Training: Pursuit Driving*	Test
Driver License Law	Test
First Responder	Test
Forms & Reports	Test
Size, Weight & Construction of Equipment	Test
Arrest, Search & Seizure	Test
ABC Laws	Test
Rules of the Road*	Test
Administrative Procedures & Directives	Test
Registration Law*	Test
Traffic Accident Investigation	Test
Activity Data	
Accidents (total number investigated in '95)	
Safety Activity	
Warnings* (total number of citations issued in '95)	
DWI's* (total number of citations issued in '95)	
Seat belts (total number of citations issued in '95)	
Driver's License* (total number of citations issued in '95)	
Speeding (total number of citations issued in '95)	

Note. * = variable retained for use in validation study based on exploratory factor analysis (see *Construct identification*, p 8).

New hires (cadets) who are not successful in training will never become Troopers. Troopers who do not complete the field training successfully will require additional training. While

training performance is clearly multidimensional, involving both declarative and procedural knowledge acquisition, it plays a key role in evaluating the success of any selection system. The purpose of the training performance analysis was to determine the key indicators of training success. Based on observations, a review of transcripts, and interviews with basic school staff, thirteen basic school course grades were selected for evaluation as potential criteria. Table 2 lists the basic school course grades which were obtained from the basic school transcripts of each trooper selected for participation in this study.

Supervisory Ratings

Performance ratings from supervisors are the most common measure of incumbent performance used in validation studies. This project had the advantage of a newly developed content valid performance evaluation instrument. The instruments were developed as part of a previous project concerning NCSHP promotion procedures. Appendix J provides a copy of the trooper performance appraisal form used in this study. It is important that supervisors who are required to rate incumbent performance have the skills and knowledge necessary to do a good job and that they actually make use of the knowledge and skills when rating subordinates. Prior to providing performance ratings for the validation phase of this project each supervisor was provided with an extensive two day performance appraisal training program. No supervisor was allowed to provide ratings prior to successful completion of the rater training program.

Field Activity

The productivity of an individual is often an important but complicated consideration in evaluating their performance. While it is illegal in the State of North Carolina to evaluate troopers on their output (e.g., number of citations), the activity of troopers is an important variable in evaluating the NCSHP at the system level of analysis. The information management unit (IMU) of the NCSHP maintains detailed records of the activity of each trooper. Based on field observations and interviews with IMU staff, six activities organized into three general categories were selected for evaluation as potential criteria. Table 2 lists the activity data that were provided by IMU for each trooper selected for the study. While activity can vary greatly and is determined by several factors, an understanding of trooper activity is crucial to evaluating the success of any selection system. The analysis involved determining descriptive indices of activity for Troopers, controlling for such factors as location (rural/urban) and traffic patterns (interstate/non interstate).

Predictor Development

Designing a selection system for Troopers presents the problem of selecting individuals for a job where considerable training and supervised field experience are required prior to actual independent job performance. A four step process was employed to identify

potential predictors. First, job analysis data was examined to determine the abilities and skills necessary to do the job. Second, predictors used by other law enforcement agencies were reviewed along with previous validation studies of police selection systems (HRStrategies, 1995; Richardson, Bellows, Henry, & Co., Inc., 1989). Six predictors were tentatively identified for possible use at this point in the procedure. Third, recent research on performance models (Campbell, 1990; Thayer, 1992; Werner, 1994) and predictors of success (Barrick & Mount, 1991; McCloy, Campbell, & Cudeck 1994) were examined. Finally, a model of the predicted statistical relationships among predictor and criterion constructs of trooper performance was developed and is presented here as Figure 3. Appendix K is a copy of the concurrent validity study description which contained the model and other information about the study.

There were two purposes for constructing a model of trooper performance. The first was to specify what relationships among predictors and criteria would be explored *in advance of collecting the information* at the construct level of analysis. The second was to insure that each construct in the model could be operationalized. Operationalizing the predictor side of the model was a rational process based on the content of the predictors. Table 3 presents the six predictors used in this study organized by the constructs on the predictor side of the trooper performance model.² A more empirical approach was used in operationalizing the criterion side of the model (see, page 9, *Construct identification*).

Table 3
List of Predictors used in Study

Construct/Predictor
Declarative Knowledge & Motivation
Law Enforcement Candidate Record (LECR)*
Procedural Knowledge
Work Problems Survey
Washington State Police Situational Judgment Test
Motivation
California Personality Inventory (CPI)
CPI: Achievement via Conformance Scale
CPI: Independence Scale
NEO PI-R Form S
conscientiousness Scale

Note. * = contains measures of cognitive ability and biographical information.

The use of a model allowed for a more construct oriented and confirmatory approach to selection test validation than has been used in previous studies. Among other advantages, examining predictor and criterion information in the light of a model of trooper performance reduced the possibility of over interpretation

² Ten additional predictors were used for research purposes only and are listed in Appendix K.

of chance statistical relationships. The model depicts trooper performance as multidimensional involving knowledge of the job, doing the job, and citizenship behaviors. This performance is presented as being caused by declarative knowledge, procedural knowledge, and motivation. The long straight arrows in this model served as the basis of our initial regression models in a subsequent phase of the project. For example, to predict citizenship only measures of motivation would be needed but to predict knowing the job measures of both declarative and procedural knowledge would be necessary.

Section 3: Validation Study

Completing the concurrent validation study involved four steps. The first step involved identifying a sample of incumbent participants. This was followed by the administration of potential predictors and the collection of performance information. The final step in the validation study was the analysis of the results.

Sample Identification

A stratified random sample of 434 troopers was drawn from a population of 1072 troopers. Factors that were examined for stratification or control included experience level, education, and race, along with training and activity performance indicators. The purpose of the stratification was to identify a large group of troopers that were representative in terms of both demographics and performance levels. A detailed examination of the demographics and performance of the existing troopers determined how the sample was drawn. An additional concern dictating the size of the sample was statistical power. The initial screening constraint for the sample was that no incumbent with less than two years experience was eligible for inclusion in the sample. There were 325 incumbents with less than the minimum experience requirement. The remaining incumbents were then stratified into three levels (top third, middle third, bottom third) of two performance measures (total number of accident investigations in '95 and total number of safety activities in '95, see Table 2) and four levels of work context (urban interstate, urban non interstate, rural interstate, rural non interstate). Finally, the performance and context categories were broken down by race of the incumbent. An added benefit of the sampling approach used in this project is that any existing variance in actual job performance in the field was identified and included in the study. Incumbents were drawn randomly from each level in roughly the same proportion that existed in the entire population. Table 4 provides a breakdown of the demographics of the sample that was chosen. The final sample presented in Table 4 includes all incumbents for which a complete set of predictor and criterion data were available (N = 396).³ Thus, the sample contains experienced incumbents from a full range of performance levels,

³ The most common causes of missing data were lack of performance ratings, training records, or predictor scores due to retirement, changes in basic school curriculum, or retirement, respectively.

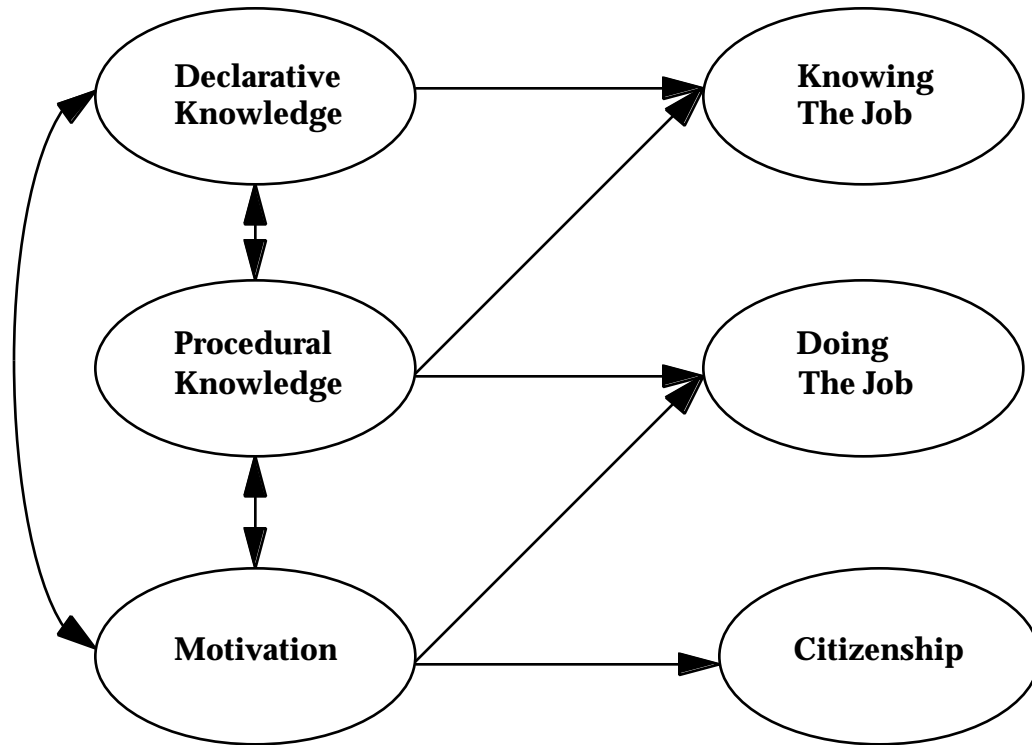


Figure 3. Trooper Performance Model

work context, and race. Over half (58%) of the troopers eligible to participate in the study (N = 747) were included. Given the relatively large proportion of eligible troopers included in this study, it is quite likely that it was a highly representative sample.

Table 4
Sample Demographic Information

Variable	f1	percent1	f2	percent2
Race				
African American	88	20.3	82	20.7
Native American	4	0.9	3	0.8
Caucasian	342	78.8	311	78.5
Experience Category				
less than 88 months	96	22.1	88	22.2
88 to 129 months*	105	24.2	101	25.5
130 to 194 months	109	25.1	101	25.5
greater than 194 months	124	28.6	106	26.8
Performance Context				
Urban-Interstate	152	35.0	136	34.5
Rural-Interstate	93	21.4	83	21.1
Urban-Noninterstate	32	7.4	31	7.9
Rural-Noninterstate	157	36.2	144	36.5

Note. f1 = initial sample, f2 = final sample, * = final sample includes a "replacement" trooper in this category.

Administration of Predictors

After the validation sample was identified, incumbents were notified and sent to a testing center to complete a battery of potential predictors. Testing took place over nine two-day sessions at the training center for the highway patrol in Raleigh, North Carolina. Appendix L provides a list of the testing session dates. The test procedure began with a brief discussion of the purpose of the study by senior NCSHP managers. A memo from the Colonel of the NCSHP containing general instructions (see Appendix M) was read and posted in the test center. Predictors used in this study were administered in the same sequence to all troopers. A number of test security procedures were also employed. All tests were numbered. Tests were administered at one testing center by one of two trained test administrators to no more than 50 troopers at a time. No test materials were allowed to leave the testing center at any time, and all materials were collected and accounted for prior to any troopers leaving the test center. Tested troopers were required not to reveal, discuss, or record the content or nature of the test. Standard mark sense answer sheets were used by troopers to record answers. Answer sheets were sealed and stored under secure conditions. Any tests not designed for reuse were destroyed at the end of the project.

Performance Information

The whole point of a validation study is to determine the relationship between possible predictors and job performance. The job performance of troopers is complex, multifaceted, and dependent on successful completion of extensive training. The approach of this study was to cast the same broad net with criteria (measures of performance) as used with predictors. Thus, supervisory performance ratings, level of activity, and training performance indicators were all included in this study. Both training data and activity data were collected prior to the administration of the predictors. Performance appraisal ratings were collected approximately six months after administration of the predictors. Immediate supervisors of troopers selected for testing were sent the newly developed performance appraisal forms (Appendix J) and asked to rate the last three months of performance. Appendix N is a copy of the rating instructions sent to each supervisor.

Data Analysis

The data analysis proceeded in four phases. The first phase

involved checking and merging the various sources of information to form the final sample for subsequent analysis. The second phase involved assigning variables to the trooper performance model (measurement model) and conducting a confirmatory factor analysis of the criterion variables. The third phase involved the calculation of composite criterion variables, zero-order validity coefficients, and predictor and criteria inter correlations. The final phase involved a regression analysis of predictor and criterion relationships and various adjustments to the zero-order validities.

Determining final sample. While every effort was made to obtain missing information, when all predictor and criterion information had been collected and merged, not all information was available for all troopers. Complete data were obtained for 390 troopers. This included two troopers who were not in the initial sample but attended the testing sessions as “replacements.” For the six troopers who had one missing score for either the Work Problems Survey (N=3) or the Situational Judgment Test (N=3) an estimated score based on a regression equation of other predictor variables was calculated. This procedure resulted in a final sample retained for further analysis of 396 (see Table 4).

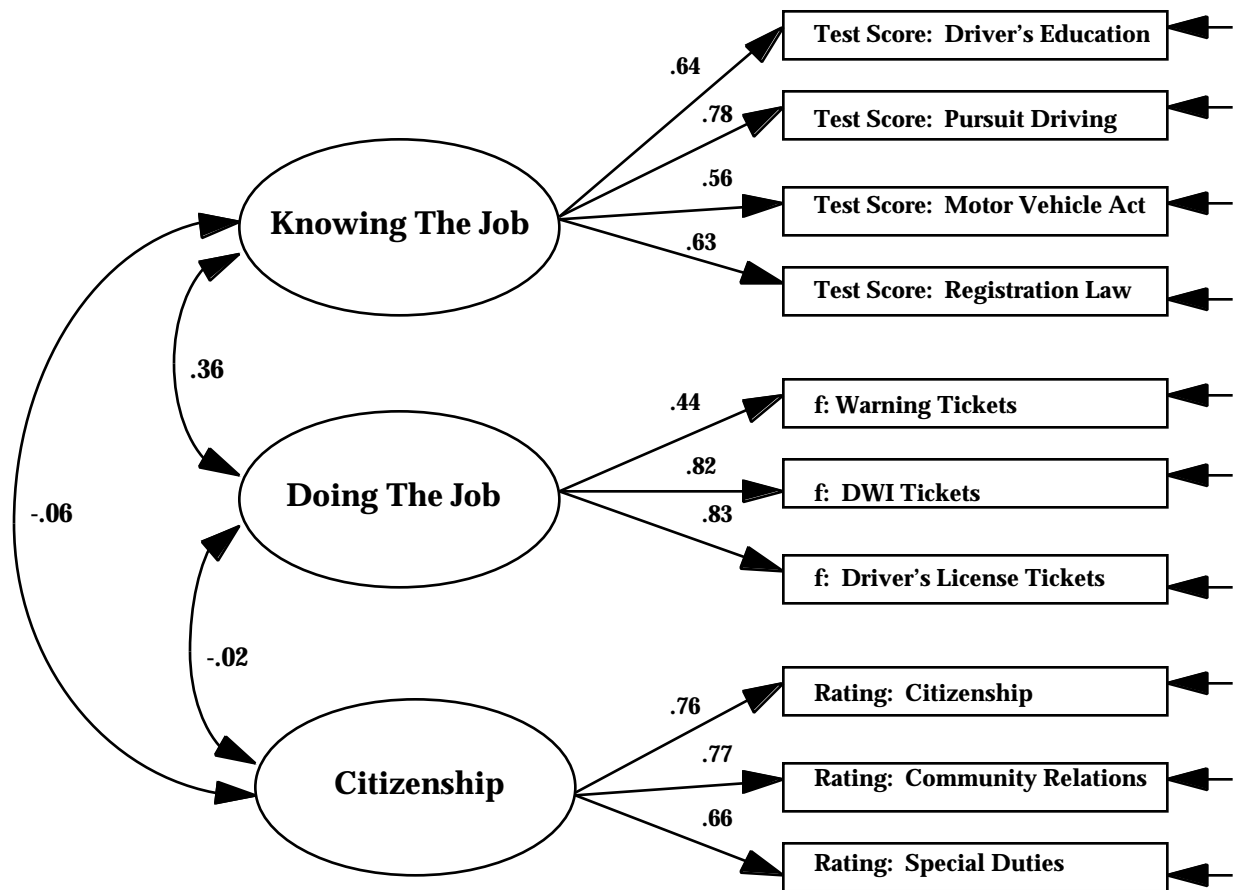


Figure 4. Confirmatory Factor Analysis of Criterion Variables

Construct identification. While a proposed model of the constructs of trooper performance had been identified, each predictor and criterion variable needed to be assigned to a construct in the model. On the predictor side this was largely a rational process based on the content of the predictor and information from the test developer. The predictors and their hypothesized constructs are presented in Table 3. The number and variety of criterion variables required a more empirical approach to construct assignment. Exploratory factor analysis of each data set along with practical considerations (N of each variable) resulted in the retention of four training variables as indicators of knowing the job, three activity variables as indicators of doing the job, and three supervisor rating variables as indicators of citizenship. The results of each exploratory factor analysis are presented in Appendix O. Because the criteria were assumed to be more unidimensional than the predictors, they were subjected to a confirmatory factor analysis using the SAS Proc Calis procedure. Figure 4 presents the results of the analysis. Model fit indicators indicated acceptable fit with a GFI of .98 and a AGFI of .96. What is striking about the confirmatory analysis of the criterion variables is the low relationship between knowing and doing the job (.36) and the nonexistent relationship between citizenship and the other constructs (-.02 & -.06). These results were interpreted to mean that the three areas of trooper performance were largely separate aspects of performance. This finding served as the basis for calculating various criterion composite scores discussed in the next paragraph of this report. Estimated factor loadings ranged from a high of .83 (driver's license tickets) to a low of .44 (warning tickets). These results were interpreted to mean that operationalization of the criterion side of the model was quite good but not perfect.

Composite criteria and bivariate analysis. The results of the construct identification provided strong support for the performance side of the model of trooper performance. However, an issue raised in the analysis is how to provide meaningful measures of the three criterion constructs? The answer for this

project was to calculate four composite criteria. The training composite was determined by calculating the average of the four training course grades. The field activity composite was determined by standardizing the three field activity variables and calculating the mean. The citizenship ratings composite was determined by standardizing the three supervisory ratings and calculating the mean. The mean composite was determined by standardizing all criterion variables in Figure 4 and calculating the mean. In all cases the standardized variables mean = 100 and the standard deviation = 10. Once the composites had been determined a series of descriptive statistics and correlations were calculated. Appendix P presents the means, standard deviations, and correlations for the study predictor and criterion variables. Appendix Q presents the means, standard deviations, and correlations for the study composite criteria. The final analysis in this phase involved the calculation of validity coefficients (zero-order correlations) among predictor and composite criteria. Table 5 provides the results of these analyses for the final sample. Appendix R provides the same results broken down separately for black and white members of the sample.

Regression analysis. Once composite criteria had been determined multiple regression techniques were used to evaluate potential selection batteries. Up to three regression models were examined for each of the composite criteria. The initial model (Model 1) was always the model derived from the trooper performance model. For example, the activity composite (doing the job) was regressed onto measures of procedural knowledge and motivation. The revised model (Model 2) was most often based on an examination of the initial model regression weights that is, variables with significant weights were retained for the revised model. If no weight was significant in the initial model predictors with significant weights from other models were examined. The low experience model (Model 3) was the revised model with the sample limited to the roughly one-fourth of the sample with the least experience (see Table 4). Table 6 provides the results of the regression analyses.

Table 5
Zero-order Validity Coefficients

Predictor	Training Composite	Activity Composite	Citizenship Composite	Mean Composite
1. Law Enforcement Candidate Record	.25**	.11*	.20**	.29**
2. Situational Judgment	.06	-.06	.13**	.07
3. Work Problems Survey	.15**	.07	.07	.15**
4. NEO P-IR: Conscientiousness	.18**	.12**	.04	.18**
5. CPI: Achievement via conformance	.10	.07	.07	.13**
6. CPI: Independence	.02	.01	.08	.05

Note. N = 396. **p* < .05. ***p* < .01.

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Table 6
Summary of Regression Analysis

Model	Predictor	B	t	Adjusted R ²	F	dfs
Dependent Variable: Training Course Composite						
Model 1: Initial Model						
	Law Enforcement Candidate Record	.25	5.02**	.06	25.24**	1, 394
Model 3: Low Experience Model						
	Law Enforcement Candidate Record	.25	2.41*	.05	5.807*	1, 88
Dependent Variable: Field Activity Composite						
Model 1: Initial Model						
	Situational Judgment	-.08	-1.48	.00	1.97	2, 393
	Work Problems Survey	.08	1.62			
Model 2: Revised Model						
	Law Enforcement Candidate Record	.11	2.23*	.01	4.97*	1, 394
Model 3: Low Experience Model						
	Law Enforcement Candidate Record	.29	2.86**	.08	8.17**	1, 86
Dependent Variable: Citizenship Ratings Composite						
Model 1: Initial Model						
	Law Enforcement Candidate Record	.21	3.70**	.03	4.30**	4, 391
	NEO P-IR Conscientiousness	-.06	-0.99			
	CPI: Achievement via conformance	.00	0.05			
	CPI: Independence	.03	0.52			
Model 2: Revised Model						
	Law Enforcement Candidate Record	.20	4.01**	.04	16.11**	1, 394
Model 3: Low Experience Model						
	Law Enforcement Candidate Record	.24	2.29*	.05	5.25*	1, 86
Dependent Variable: Mean Composite						
Model 1: Initial Model						
	Law Enforcement Candidate Record	.27	4.66**	.08	7.07**	6, 389
	Situational Judgment	-.01	-0.29			
	Work Problems Survey	.07	1.26			
	NEO P-IR Conscientiousness	.08	1.37			
	CPI: Achievement via conformance	.00	-0.03			
	CPI: Independence	-.07	-1.27			
Model 2: Revised Model						
	Law Enforcement Candidate Record	.29	6.11**	.08	37.38**	1, 394
Model 3: Low Experience Model						
	Law Enforcement Candidate Record	.44	4.49**	.18	20.14**	1, 86

Note. * $p < .05$. ** $p < .01$.

What is clear from the regression analysis is the overwhelming significance of the LECR in predicting all four composite criteria. Based on the regression analyses the LECR was the sole predictor retained for use in the final selection battery. The final set of analyses involved calculating corrections to the validity coefficients of the LECR. The first corrections were for unreliability in the criterion (Guion, 1965). However, because we were unsure as to actual criterion reliability corrections were calculated for four different levels of reliability for each of the validity coefficients. Appendix S provides the results of correcting the zero order correlations for unreliability in the criterion. The second corrections did not build on the first and were for range restriction in the predictor (Cohen & Cohen, 1975). The test publisher provided a standard deviation (18.9) of test scores in an applicant population which served as the basis of this correction. Appendix T provides the results of correcting the zero order correlations for restricted range in the LECR predictor.

Section 4: Selection System

Developing the final content and procedures of the trooper selection system involved a series of reviews and consultation with NCSHP management and others (see Figure 1). These consultations and reviews, along with the information collected in this study, resulted in the final recommendations for the new selection system. The discussion of the recommended selection system is followed by a presentation of Uniform Guidelines documentation requirements relevant to this project.

Selection System Recommendations

The AB met on 9/3/97 to receive a report on the test validation study and to make recommendations on the content and the process of the new selection system. The recommendations include seven major changes to the selection process and four major content changes. The recommendations based on this meeting are provided in Appendix U. Figure 5 provides a graphic depiction of the new system. The recommended new selection process is a mixture of the multiple hurdle and compensatory approach to selection. Major decision points are represented in the equation listed below:

$$E, PB, CGN_1, LECR + CGN_2, P/B/ARB$$

Where E is a minimum education requirement, PB is a preliminary background check, CGN_1 is a minimum of the 40%ile gender norm on the Cooper Standards, LECR is a score on the Law Enforcement Candidate Record, CGN_2 is the Cooper Standards gender normed score, P is the polygraph exam, B is the background investigation, and ARB is the applicant review board. The LECR and CGN_2 scores are added to calculate a combined score in order to rank order candidates. Information from P and B are considered by the ARB in making their final recommendations to the Commander of the NCSHP for hiring.

Targeted Recruiting

- Overseen by Director of Administrative Services
- Create Targeted Recruiting Special Assignment
- Supply All Troopers with Recruitment Pamphlets
- Develop Recruiting Tools (e.g., realistic video)



District Office

- Applications will be accepted for 3 months out of the year
- The prospective applicant schedules time to meet with designated officer at the district office
- Applicant Video is shown and preliminary background check completed
- Application Packet presented and reviewed with potential applicant
- Completed Applications presented at meeting with Troop Lieutenant



Troop Lieutenant

- Application and Documents Reviewed
- F3 Reviewed and Importance of Truthfulness is Stressed
- Completed Application Packet and Memo of findings sent to Administrative Services



Initial Screening

- Initial Screening Conducted once a year
- Applicant must score above 40%ile on Cooper Norms to proceed
- Applicants complete Law Enforcement Candidate Record (LECR)
- Final Score = Cooper Score + LECR Score



Polygraph Examination



Background Investigation

- Background Investigation Completed and sent to Troop Commander
- Troop Commander Reviews Background Investigation and Consults with Investigator
- Reviewed Background Investigation sent to Administrative Services



Applicant Review Board

Figure 5. NCSHP Trooper Selection Process

System Changes. Major change recommendations include the aggressive use of targeted recruiting techniques for women and minorities. Another change is the use of a new realistic job preview applicant video to be viewed prior to receiving an application packet. A new preliminary background check to be completed at initial application has been added to the process. Completed applications will now undergo a field review by Troop Lieutenant prior to being submitted. All applications will be accepted during a 3 month period followed by an initial screening to be conducted once a year.

After discussions with members of The Cooper Institute for Aerobics Research (CIAR)⁴ it was decided to replace the current agility test with the fitness test from CIAR. These fitness tests are referred to as the Cooper Standards. CIAR has conducted extensive normative research on the tests and has calculated separate norms based on gender. CIAR has found that recruits below the 40%ile on the Cooper Standards normed for gender are much less likely to successfully complete the physical aspects of many law enforcement basic training schools. Hence, as part of the initial screening, a minimum of the 40%ile on Cooper Gender Norms will be required to continue in the process. However, the AB decided to continue a previous practice of using the new physical assessment test as a continuous score. Evidence in favor of the inclusion of physical assessment tests in the selection process include the exit interviews, the job analysis, and a preliminary study conducted by the NCSHP basic school training staff. Exit interviews and the job analysis both revealed that physical performance is an important component of both the basic school and the job. Preliminary results from a study conducted by NCSHP indicate a relationship between performance on the Cooper Standards and graduation from basic school.⁵ However, this study did not directly examine the relationship between job performance and the Cooper Standards.

Use of the Law Enforcement Candidate Record (LECR) written test is the final change recommended for the new system. This recommendation was based on the concurrent validation study described in this report. More specifically, the overwhelming superiority of the LECR in predicting **all** of the criterion composites over other potential predictors provides strong support for the validity of the test. Moreover, the low experience models reported in this study for the LECR revealed moderate to substantial increases in test validity over initial and revised models based on the entire sample.

Uniform Guidelines Documentation

The purpose of this section of the report is to comply with the documentation requirements for validation studies in the Uniform Guidelines on Employee Selection Procedures. The section will begin with a list detailing test publisher information. The remainder of the discussion will be organized in the same

⁴ see CIAR (1995) fitness specialist course.

⁵ see NCSHP (1997) cadet fitness study.

sequence as the Guidelines using the same numbers, letters, and subject headings. The reader will also be referred to other sections of this report with information relevant to the topic. Because this study employed both criterion-related and construct strategies the relevant portions of both sections of documentation requirements (15B & 15D) will be discussed.

*Test Publishers.*⁶

CPI:

Consulting Psychologists Press, Inc.
3803 E. Bayshore Road
Palo Alto, California 94303
415-969-8901

LECR:

Richardson, Bellows, Henry & Co., Inc.
2700 S. Quincy Street, #310
Arlington, Virginia 22206
703-998-4800

NEO PI-R:

Psychological Assessment Resources, Inc.
P.O. Box 998
Odessa, Florida 33556
800-331-8378

Work Problems Survey:

Curry Business Systems, Inc.
3116 Harriett Road
Silver Lake, Ohio 44224
330-686-7912

15B(1) User(s), locations(s), and date(s) of study. A complete time line for this project is provided in Appendix A. A similar time line for the job analysis is provided on page 6 of the job analysis technical report (Wilson, M. A., Grant, L. D., Freund, K. L., & Levine, J. D., 1995). Section 1 of this report (see page 3) provides a detailed discussions of the procedures used in this study.

15B(2) Problem and setting. The Statement of Approach at the beginning of this report (see page 1) provides a detailed discussion of the purposes of this study. A detailed discussion of the existing selection system is provided in the consent decree in Johnson & U.S. v. State of N.C., et al. (1980).

15B(3) Job analysis or review of job information. Job analysis information relevant to this report is discussed in Section 2 (see page 4). Figure 2 provides a graphic representation of the types and sources of job information used in this study (see page 4). A more detailed discussion of the job analysis is provided in a previous job analysis technical report (Wilson, M. A., Grant, L. D., Freund, K. L., & Levine, J. D., 1995).

⁶ The Washington State Police Situational Judgment Test is not available for public purchase and is the property of the Washington State Police. The test was used in this validation study under a special "one-use-only" agreement between NCSHP and the Washington State Police.

15D(3) Construct definition. The constructs used in this study are presented in Figure 3 on page 7. Research studies relevant to these constructs is discussed in the Predictor Selection section of the technical report on page 6 & 7. Evidence for the construct validity of the criterion model is presented in Figure 4 on page 8 and discussed in the construct identification section of this report on page 8 & 9.

15B(4) Job titles and codes. The official job title used by NCSHP for the job that is the subject of this study is “State Trooper.” The job in the Dictionary of Occupational Titles that is closest is “State Police Officer” (D.O.T. Code, 375.263-018; S.O.C. Code, 5132).

15B(5) Criterion measures. The criterion measures used in this study and the rationale for selecting them are discussed in Section 2 (see page 4). The final set of criterion measures are presented in Figure 4 on page 8 of this report. The calculation of composite criteria is discussed on page 9.

15B(6) Sample description. The selection of the sample of Troopers used in this study is discussed in Section 3 (see page 6). Table 4 on page 7 provides some demographic information about the sample.

15B(7) Description of selection procedures. A discussion of the potential predictors evaluated in this study is presented in Section 2 (see page 5). The final selection system recommendations are presented in Section 4 (see page 11). Figure 5 provides a graphic depiction of the recommended selection procedure.

15D(7) Relationship to job performance. Evidence for the criterion related validity of the criterion constructs used in this study is presented on page 9 & 10 of this report.

15B(8) Techniques and results. The analysis of the validation data are presented is discussed in the Data Analysis section on page 8. Figure 4 presents the results of a confirmatory factor analysis of the criterion variables. Tables 5 presents the zero-order validity coefficients and Table 6 presents the results of the regression analysis. Appendices O, P, Q, R, S, & T provide descriptive statistics, various sub sample analyses, and statistical corrections.

15B(9) Alternative procedures investigated. With regard to investigation of alternative procedures, this project had the advantage of being conducted at a time when other validation studies involving police had recently been completed or were in the process of being completed (see, HRStrategies, Inc., 1995; Aon Consulting 1996). A primary goal of these studies was to reduce the disparate impact of the selection process. Each of these studies completed extensive reviews of the literature concerning alternative procedures. These reviews and the procedures adopted in the two studies were examined as part of this study. While the

specific predictors used in this study are different, the predictor constructs used in this study are quite similar to those employed in the previous studies and the validities reported here are higher.⁷ A number of predictors were also examined in this study which were not retained for final use (see Tables 5 & 6) based on the validity data.

With regard to impact, one observation and two thought experiments were in order. Actual applicant data will be necessary to evaluate the impact of the recommended selection system. Given the large number of changes in the system it may take some time before complete impact data are available. This information will be closely monitored over the next two years.

The first thought experiment examines the impact of the LECR treating the data of the incumbents as applicant data. What would be the impact of hiring the top 120 “applicants” (i.e., using the list from the test “top down” for a year to select 2 basic school classes of 60 each) based solely on a rank order of their LECR score? With the concurrent validation data the answer is that 15% would be black. The second thought experiment examines the impact of small sample size on the estimation of minority validation data. What would be the effect on estimated validities of randomly drawing 82 white incumbents (the number of minority incumbents in the sample) from the validation data and calculating validities based on this smaller sample? The answer is drastic declines in the estimated validity for several of the composite criteria. Neither thought experiment provides any clear information about impact in an applicant sample but they provide some basis for hope until such data are available.

15B(10) Uses and applications. All information about the recommended selection system content, procedure, and rationale is presented in Section 4 (see page 11). A discussion on potential impact was presented in the two preceding paragraphs of this report. The purpose of the recommended system is discussed in the Statement of Approach (see page 1). The unit weighting of the LECR and CGN₂ are presented in Section 4 (see page 11). The 40%ile cutoff on CGN₁ was determined in consultation with representatives of the Cooper Institute.

15B(11) Source data. Source data will be maintained by NCSHP Office of Research and Planning.

15B(12) Contact person. The contact person for this validity study is:

Dr. Lisa D. Grant
Industrial Psychologist
512 N Salisbury
P.O. Box 29590
Office of Research and Planning

⁷ Direct comparisons with other validation studies may be based on assumptions which the reader does not share. It is always best to examine all the technical reports and decide for yourself.

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those who are interested in hiring and promotion issues because of the controversy and conflict associated with the area. This state of affairs is alarming, tragic, and unacceptable. It is hoped that the procedures and results presented in this technical report will provide one possible framework for other agencies to follow and improve upon.

15B(13) Accuracy and completeness. Every effort has been made to make this report accurate and complete. A section on how to find information in this report is designed to help the reader find needed information quickly (see page 2).

Conclusions

Current Practices

If three national summit meetings of highway patrol and state police agencies have taught us anything, it is that there is considerable interest in improving promotion and hiring decisions. These meetings have also revealed that there is little consensus as to what the improvements should be and how they should be implemented. There is much greater consensus that the goals of any improvements should be a single defensible system which treats everyone equally and which results in higher performing and diverse employees. Achieving these goals in the increasingly complex and dynamic environments where these agencies operate will not be easy and may require fundamental changes in the design and operation of hiring and promotion systems.

What changes might be necessary? The most important change is to accept the fact that complex and dynamic environments require more complex and dynamic promotion and hiring systems. Both the system and the environment must be constantly monitored, evaluated, and altered when necessary. Few agencies as currently structured can successfully make this change without forming partnerships and hiring professionals to help. Partnerships can be formed with other agencies, universities, or consultants. What is important is that these partnerships should be long term, flexible, and managed carefully. These partnerships are so important to success that a key person inside the agency should be assigned to develop and manage them. Hiring an Industrial and Organizational Psychologist to fill this role will be an extremely cost effective investment that will pay off in many unexpected ways.

Future Research

Few areas of Industrial and Organizational Psychology have a larger gap between theory and practice than hiring and promotion. Common reasons to explain the gap include the expense of doing research in this area and the mistaken impression held by some that validation is only necessary when using paper and pencil tests. Research involving police is too often avoided even among

A number of areas deserve further investigation. The construct approach to validation in police organizations needs replication and further methodological and conceptual development. It is possible that widespread use of structural equation modeling with validation data will reveal a far more complicated picture of performance than is currently assumed to be the case. The results of this study indicate that the relationship between biodata and personality needs more exploration. Could biodata be revealing the patterns of a conscientious life? As personality measures come into more wide spread use, more knowledge on the effects, detection, and prevention of faking is needed. The results of the low experience models reported in this study may allow for a better comparison to recent studies that have focused on less experienced incumbents (Aon Consulting 1996). It also raises questions about the impact of the experience level of incumbents on the estimation of test validity. However, further investigation with larger sample sizes is needed before firm conclusions can be drawn. Finally, vast amounts of variation in performance remain unexplained by commonly used predictor sets. More attention should be focused on identifying and refining new measures. This study examined two different measures of situational judgment with mixed results. The more generic Work Problems Survey was related to performance but did not explain additional variance in the regression models. The Washington State Police Situational Judgment test was more face valid but showed no predictive validity in this study.⁸ It may be that high fidelity situational judgment tests would be more useful after some training has taken place. Situational judgment may also perform quite differently in applicant validation samples.

Acknowledgements

The authors of the report wish to thank all the members of the North Carolina State Highway Patrol for their help in completing this project. This project would not have been possible without support of Colonel E. W. Horton. Major George Ake has provided invaluable help in nearly every phase of the project on a day-to-day basis. The members of the NCSHP Advisory Board devoted many hours of their time and had important insights that made the project much better. Often in tedious or demanding situations, we have found the people of the North Carolina State Highway Patrol to be courteous, professional, helpful, and motivated to bring about positive change. A special thanks is reserved for the Oregon State Police who hosted the Third National Summit Meeting on Hiring and Promotion Issues, thus insuring that the summit will live on past this project.

⁸ After the validation study this test was substantially revised and rescored. The version used in this study is no longer in use.

The Principal Investigator wishes to thank the members of the Technical Advisory Board for their ideas and support. Their participation has made the project not only better but more enjoyable on a professional level. Finally, while it may not have always been expressed, the many hours of work of the Research Assistants, Renee Lao and Kristin Murphy has not gone unnoticed and is greatly appreciated.

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Revisions

The revisions in this report correct a minor scaling problem in the rescaling program for the supervisory ratings criteria and the misclassification of the experience level of three incumbents. The text and recommendations of the original report were not altered.

Frequently requested appendices data:

Entire Sample Data from Appendices P & Q

Means, Standard Deviations, and Correlations for Predictors for Entire Sample

Predictor	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Law Enforcement Candidate Record	75.1	8.2					
2. Situational Judgment	256.5	9.9	.29**				
3. Work Problems Survey	19.7	4.0	.31**	.23**			
4. NEO P-IR: Conscientiousness	128.5	14.2	.40**	.06	.20**		
5. CPI: Achievement via conformance	29.0	4.2	.40**	.18**	.23**	.46**	
6. CPI: Independence	18.3	2.9	.33**	.12*	.13**	.32**	.40**

Note. N = 396. **p* < .05. ***p* < .01.

Means, Standard Deviations, and Correlations for Criterion Composite Variables for Entire Sample

Criterion	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Test Score: Driver's Education	90.4	3.8									
2. Test Score: Pursuit Driving	90.1	3.5	.50**								
3. Test Score: Motor Vehicle Act	92.5	5.7	.38**	.42**							
4. Test Score: Registration Law	95.4	5.6	.35**	.53**	.33**						
5. f: Warning Tickets	268.9	162.4	.24**	.23**	.13**	.20**					
6. f: DWI Tickets	43.6	25.8	.16**	.23**	.16**	.23**	.34**				
7. f: Driver's License Tickets	86.9	42.4	.15**	.22**	.09	.20**	.37**	.68**			
8. Rating: Citizenship	2.6	1.2	-.02	-.01	.02	-.01	-.11*	-.04	-.02		
9. Rating: Community Relations	2.5	1.1	.02	-.07	-.04	-.01	-.08	.00	.06	.58**	
10. Rating: Special Duties	2.6	1.0	.02	-.04	-.07	-.01	-.04	-.03	.06	.51**	.51**

Note. N = 396. **p* < .05. ***p* < .01.

Means, Standard Deviations, and Correlations for Composite Criteria for Entire Sample

Criterion	<i>M</i>	<i>SD</i>	1	2	3
1. Training Course Composite	92.1	3.5			
2. Field Activity Composite	100.0	8.0	.30**		
3. Citizenship Ratings Composite	100.0	8.2	.00	.02	
4. Mean Composite	100.0	5.0	.74**	.67**	.50**

Note. N = 396. **p* < .05. ***p* < .01.