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An Evaluation of the Utility of AT-SAT for the Placement of New Controllers by Option

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16. Abstract

As a follow-up to the completion of the Concurrent Validation of the Air Traffic Selection and Training (AT-SAT) test for Tower Controller Hiring (CoVATCH) project, we investigated the utility and fairness of using AT-SAT scores to place Air Traffic Control Specialist (ATCS) applicants into terminal or en route facilities. Generally speaking, controller pay is higher at en route facilities than at most terminal facilities; placement by option thus affects the terms and conditions of employment and therefore is a selection decision within the scope of the *Uniform Guidelines on Employee Selection Procedures* (Equal Employment Opportunity Commission, 1978). While results of statistical analyses indicated that AT-SAT could be considered a valid tool for use in placement, based on technical considerations only, it was concluded that it should not be used in that way due to lack of utility and potential for adverse impact. The analyses indicated that if AT-SAT were used for placement, while the field training success rate (the proportion of developmentals achieving Certified Professional Controller status at the first field facility) would increase in en route facilities, the success rate would decrease in terminal facilities. Since more positions are available at terminal facilities, the overall success rate across both options would not change substantially and might actually decrease slightly. Furthermore, using AT-SAT to place new ATCSs into en route or terminal facilities might have adverse impact on blacks, Hispanics, and females. If the FAA were to use AT-SAT for placement, the risk of additional adverse impact and pay disparities should be evaluated against the marginal utility of placement in terms of changes in field training success rates. In sum, given the findings of both validation studies, the analyses conducted here, and the projected ratio of controllers that will likely be hired into each option, using AT-SAT scores to guide placement decisions is not recommended at this time.

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An Evaluation of the Utility of AT-SAT for the Placement of New Controllers by Option

The air traffic control specialist (ATCS, or controller) occupation is considered to be an intellectually challenging, important, and prestigious career field by the majority of recently hired developmental controllers (Cannon & Broach, 2011). The Federal Aviation Administration (FAA) projects hiring approximately 1,300 new controllers per year over the next five years to replace retiring controllers (FAA, 2014). Excluding rehires or others with previous ATCS experience, it is required that applicants receive a passing score on an aptitude test to be hired into the occupation (U.S. Office of Personnel Management [OPM], 2013). Currently, the computer-administered Air Traffic Selection and Training (AT-SAT) test battery is the aptitude test used by the FAA to assess applicants under the OPM occupational qualification standards.

The validity of AT-SAT as a predictor of ATCS job performance was demonstrated in two concurrent, criterion-related validation studies. The first study was reported in 2001 by Ramos, Heil, and Manning (2001a, b). Approximately 1,000 incumbent en route controllers took the proposed test battery. Job performance data were collected concurrently in two forms: Behavioral Summary Scale (BSS) ratings of job performance by peers and supervisors; and the en route Computer-Based Performance Measure (CBPM; see Borman et al., 2001). These measures were combined into a composite score with a 60% contribution from the CBPM and a 40% contribution from the BSS ratings. The correlation between scores on the test battery and the composite job performance measure was .51 without any corrections for range restriction or criterion unreliability. With correction for incidental range restriction, the correlation was .68 (Waugh, 2001). The American Institutes for Research (AIR®, 2012) conducted the second study, named the Concurrent Validation of AT-SAT for Tower Controller Hiring (CoVATCH). Incumbent air traffic control tower (ATCT) controllers (N = 302) took the current operational version of the AT-SAT test battery. As in the original en route validation study, two classes of job performance data were collected: BSS ratings of job performance by peers and supervisors; and performance on the Tower Simulation-Based Performance Measure (TSBPM) (see Horgen et al., 2012). The correlation between a regression weighted composite of AT-SAT subtest scores and the composite of the two criterion measures was .42 without any statistical corrections (AIR®, 2012). These two studies independently demonstrated that AT-SAT is a valid predictor of ATCS job performance.

Placement of new controllers has been a continuing concern in Congressional hearings and oversight with relatively recent recommendations to consider the use of AT-SAT for placement purposes (U. S. Department of Transportation Office of the Inspector General, 2010). AT-SAT scores are currently used for the selection of applicants into the ATCS occupation, but scores are not currently being used to place selected applicants into different options or career tracks.

BACKGROUND

Before placement can be discussed, it is useful to understand the nature and structure of the organization within the FAA responsible for air traffic control operations and facilities. This organization, called the Air Traffic Organization, or ATO, can be divided into two major partitions, also referred to as *options*: Terminal Services and En Route/Oceanic Services. New hires can be placed into either the *Terminal* option or the *En Route* option. These options also coincide with the primary training tracks currently operating within the FAA Academy. Within each option, there are several *types* of facilities to which a new hire could be assigned. In en route, the vast majority of facilities are air route traffic control centers (ARTCCs, or en route centers), but there are also combination terminal radar approach control (TRACON)/en route facilities call combined center approach control centers (CERAPs). On the terminal side, there are airport traffic control towers (ATCTs), stand-alone TRACONs, and combined tower/TRACON (CTT) facilities.

At en route centers, controllers handle high altitude air traffic between airports, work that is generally considered very complex and demanding. At TRACONs, controllers direct traffic within about 50 miles of an airport, usually during initial climb and final descent of the aircraft. This work can also be considered very demanding. The work at ATCTs involves directing air traffic on the runways and in the immediate vicinity of the airport, as well as issuing takeoff and landing clearances. This type of air traffic control (ATC) is generally considered somewhat less complex and less demanding than radar ATC, but that can vary greatly by location.

The FAA also classifies all facilities by *level*, from low to high, considering, among other things, the amount and complexity of traffic controlled by the facility. Thus, a newly hired controller could potentially be placed into a mid- to high-level en route center, a mid- to high-level TRACON, or at any CTT/tower-only facility, from low to high level, depending on agency needs. With this amount of variety in the difficulty and complexity of the work, it is becoming more and more important for the FAA to address the issue of placement.

Historically, the failure rate in on-the-job training for new controllers has been higher in en route facilities (Manning, 1998). This difference in difficulty and complexity is evidenced in how the positions in different facility types are classified for pay purposes. Controller positions at en route centers generally have the highest pay grades in the occupation. Controller positions in towers generally have lower pay grades than en route positions. Thus, there are both organizational (success and failure rates in facility on-the-job training) and individual economic consequences attached to placement decisions. Moreover, because placement affects the terms and conditions of employment

(especially starting pay), it is an employment decision, as defined by the *Uniform Guidelines on Employee Selection Procedures* (29 C.F.R. § 1607.2B) (EEOC, 1978). Therefore, using AT-SAT scores for placement, as recommended by the Department of Transportation Inspector General (2010), must be validated.

To use a test score for placement purposes, the relevant professional standards and principles require "evidence that scores are linked to different levels or likelihoods of success among jobs" (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999, p. 160). Relevant evidence might include a pattern of differential relationships between predictors and criteria by job type (Society for Industrial and Organizational Psychology [SIOP], 2003). For example, the correlations between AT-SAT sub-tests and job performance might vary as a function of option (terminal versus en route) or level. Other relevant evidence might include differences in expected success and failure by option as a function of test scores. An explicit purpose of the CoVATCH project was to collect empirical data to support an evaluation of AT-SAT as a tool for placement by option (terminal versus en route).

In their analysis of the CoVATCH data, AIR® (2012) was not able to provide any evidence suggesting that AT-SAT could be used for placement by facility level. However, they did report evidence for validity by option in that the regression equation (i.e., the weight given to each subtest) for tower was *not identical* with the equation for en route, as reported by Ramos et al. (2001a, b). Unfortunately, there were few differences in the recommended option placement when the two equations were used to hypothetically place individuals in their sample of 300 tower controllers. This finding was consistent with the 1995 controller job-task analysis that found nearly identical worker requirement profiles across en route and terminal options (Nickels, Bobko, Blair, Sands, & Tartak, 1995). However, AIR® did not have access to data from en route controllers for comparison purposes. AIR® concluded that AT-SAT *might* be used for placement by option but further analyses were needed. Thus, the purpose of the current study was to extend the AIR® analysis by using AT-SAT validation data collected from both en route and terminal controllers.

PLACEMENT RULES

AT-SAT scores might be used for placement in many different ways. For example, persons with scores above some cut-off might be assigned to the en route option, while persons with scores below that cut-off might be assigned to terminal. Or scores might be categorized into ranges, with persons in the lowest range assigned to one option, persons in the highest range assigned to the other option, and persons with scores in the middle range assigned to either option, depending on agency needs.

Thus, the first step in this analysis was to decide how AT-SAT scores would likely be used for placement. At the time of this analysis, FAA extended tentative job offers to applicants for a specific air traffic control facility. The decision to place a particular applicant at a specific facility was made by members of the Centralized Selection Panel (CSP). This panel, made up of selecting officials from air traffic facilities, was convened to select and place applicants based on agency need, the geographic and option (i.e., en route or terminal) preferences indicated by an applicant, and a review of the application – which include AT-SAT score band information (i.e., Qualified or Well-Qualified) but not the actual score (U. S. Department of Transportation Office of the Inspector General, 2010). Currently, the CSPs are no longer used to make initial selection decisions, option track assignments are randomized, and specific facility placement decisions are delayed until completion of Academy training.

To use AT-SAT for placement decisions, AIR® suggested computing a score for each option, based on the option-specific regression equations. As no AT-SAT validation study has been conducted specifically for TRACON positions, the equation derived from the tower sample was used to represent the entire terminal option. The applicants would then be assigned to a score band within each option. For example, an applicant could be classified as Well-Qualified Terminal and Qualified En Route (or vice versa), Well-Qualified in both, or Qualified in both. Current use of AT-SAT defines Well-Qualified as a score of 85-100, Qualified as a score of 70-84.9, and Not Qualified as 69.9 and below.

The placement procedure suggested by AIR® is feasible but has three drawbacks. First, the overall ranking of an individual (which impacts hiring decisions) is confounded with their ranking within an option (which impacts placement decisions). This might make the initial selection of a candidate more complicated and less systematic with more judgment and consideration being required of decision makers for each individual case. For example, a candidate could be Qualified in one option and Well-Qualified in another. If all positions are filled in the option for which they are Well-Qualified, will they be given less consideration for employment, even though they might have been categorized as Well-Qualified overall under previous hiring procedures? In the end, should the decision makers consider this candidate Qualified or Well-Qualified? An even more complicated situation would arise if, for example, an applicant was Well-Qualified or Qualified in one option and Not Qualified in another.

Table 1
Correlations Between Current, En Route, and Terminal AT-SAT Scores and 1st Facility Success

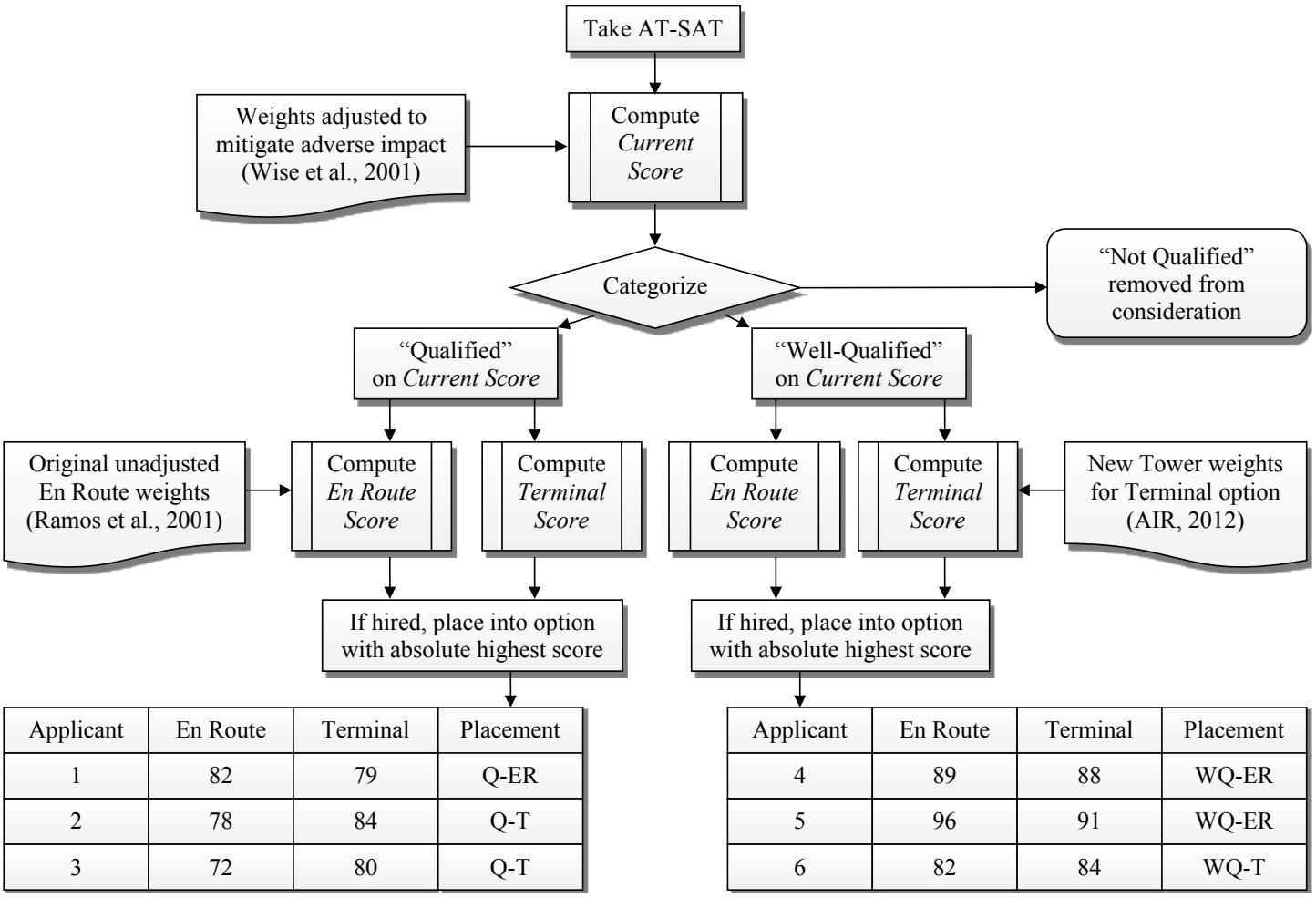
	Current	En Route	Terminal
Current			
En Route	.880		
Terminal	.651	.793	
1st Facility Success	.120	.210	.176

Note. All correlations significant at $p < .01$, $n = 2{,}332$. Current, En Route, and Terminal AT-SAT scores are based on similar, but slightly different equations developed through two AT-SAT validation studies.

Second, given the width of the categorical bands and the correlation found between the current en route score (used by AIR® as the basis for en route placement) and the tower score ($r = .65$, see Table 1), it would be expected that if the placement rules suggested by AIR® were used, a good portion of candidates would receive the same categorical ranking for both options (i.e., Well-Qualified or Qualified in both options). This would not provide useful information on which to base a placement decision, and the decision makers would be required to judge each case individually, considering geographic preferences or relying on a randomized assignment system.

Third, the en route equation was reweighted to find an optimal balance between validity and the reduction of adverse impact, but the tower equation reported by AIR® was not weighted in a similar way. This suggests that the en route equation used by AIR® in their analysis would produce a different option score for reasons other than "true" subtest relationships to performance. Part of the difference in option scores would be due to the unique weights composing each option equation, but another part of the difference in option scores could be attributed to the adjustments made to reduce adverse impact that are present in the en route equation and not in the tower equation.

Taking these drawbacks into account, we investigated an alternative approach to placement. The first step would be to categorize individuals using the current operational AT-SAT equation, which was weighted to mitigate adverse impact (Wise, Tsacoumis, Waugh, Putka, & Horn, 2001), into Well-Qualified, Qualified, and Not Qualified categories using the current cut scores as a basis for initial selection. Second, two additional composite scores would be computed based on (a) the original, unadjusted weights for en route (Ramos et al., 2001a, b), and (b) the tower equation developed by AIR® (2012) for terminal. For convenience, these will be referred to as the *Current*, *En Route*, and *Terminal* scores, respectively, throughout the rest of this paper.



Applicant	En Route	Terminal	Placement
1	82	79	Q-ER
2	78	84	Q-T
3	72	80	Q-T

Applicant	En Route	Terminal	Placement
4	89	88	WQ-ER
5	96	91	WQ-ER
6	82	84	WQ-T

Figure 1. Hypothetical Placement Flowchart

The applicant's hiring status would first be determined by using the *Current* score to determine the initial categorical rankings. Persons categorized as "Not Qualified" on the basis of their *Current* score would be removed from further consideration. Next, the *En Route* and *Terminal* scores would be computed for each person, using the respective option-specific weights. Whichever score was higher would serve as the placement recommendation, as shown in Figure 1. In the rare event of a tie, the applicant would be given a recommendation of "*Either*." The initial categorization based on the *Current* score would then be attached to this option recommendation.

EVALUATION OF PROPOSED PLACEMENT APPROACH

The following analyses were conducted to evaluate the proposed placement approach. First, logistic regression analyses were completed to verify the relationship of AT-SAT scores (computed using the three equations) to first facility training success, a criterion measure not used in the two previous concurrent, criterion-related validation studies. First facility training success refers to whether or not developmental controllers achieved certified professional controller (CPC) status at their first facility. Second, cross-tabulations were computed to examine the potential outcomes and utility of using AT-SAT for placement. Third, given that placement would constitute an employment decision encompassed by the *Uniform Guidelines on Employee Selection Procedures*, the potential for adverse impact was assessed against the 4/5ths rule (29 C.F.R. § 1607.4D) (EEOC, 1978).

The data used for these analyses were extracted from FAA AVIATOR, the Air Traffic National Training Database (NTD), the AT-SAT database, and the FAA Personnel and Payroll System (FPPS). Extracted information included AT-SAT test scores, race, gender, pay, and developmental training status. The sample used for the adverse impact analyses included anyone who had taken AT-SAT (N = 18,663) *and* who had race/gender information available (Race: N = 15,052; Gender: N = 14,115). The sample used for all other analyses included individuals who had AT-SAT data and a finalized first facility outcome (i.e., achieved CPC, failed, or transferred from first facility due to performance) by July 2012 (N = 2,332). In both samples, individuals had submitted an application for an ATCS position between 2007 and 2009.

Table 2
Actual Versus Hypothetical Placement

	Hypothetical Placement	
Actual Placement	**En Route**	**Terminal**
En Route	547 *(Correct placement)*	297 *(Incorrect placement)*
Terminal	881 *(Incorrect placement)*	607 *(Correct placement)*

Table 3
Cross-tabulation of Training Completion Rates at 1st Field Facility

Actual Placement	Hypothetical Placement	Unsuccessful		Successful		
		N	**%**	**N**	**%**	**Total**
En Route**	En Route	111	20%	436	80%	**547**
En Route	Terminal	79	27%	218	73%	**297**
Terminal	En Route	153	17%	728	83%	**881**
Terminal**	Terminal	159	26%	448	74%	**607**
Total		**502**	**22%**	**1,830**	**78%**	**2,332**

Note. **Indicates "correct" placement – meaning that applicants were actually placed in the option that AT-SAT would have predicted had it been used for this purpose at the time of hire.

RESULTS

Logistic Regression

The results of the logistic regression analyses showed that the *Current* – R^2 = .022, χ^2 (1, 2332) = 32.71, $p \leq .001$, *En Route* – R^2 = .064, χ^2 (1, 2332) = 99.32, $p \leq .001$, and *Terminal* – R^2 = .047, χ^2 (1, 2332) = 71.88, $p \leq .001$ scores (based on the previously derived equations) were statistically significant predictors of first facility training success. The raw correlations between these scores and first facility training success, uncorrected for range restriction, were similar but not identical to each other and can be found in Table 1. These findings parallel the results obtained during both concurrent validation studies to assess the predictive validity of AT-SAT using ordinary least squares regression analyses and other types of job performance measures (i.e., scores on the BSS and TSBPM), as well as the results of a longitudinal validation of AT-SAT using first facility training success as the criterion (see Broach et al., 2013). Additionally, when logistic regression analyses were run separately for the *En Route* and *Terminal* samples (not restricting subtest weights based on the previously derived equations), the subtest scores were differentially correlated with first facility training success similar to the findings of AIR® that the subtest weights using a sample of tower controllers were not identical to those found in the original en route validation study. Taken together, this evidence demonstrates some degree of differential validity (i.e., overall validity coefficients are different by option samples) and prediction (i.e., the weights of each subtest vary for each option sample), both technical requirements as described by the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999), as well as the *Principles for the Validation and Use of Employee Selection Procedures* (SIOP, 2003). In other words, based on the considerations encompassed by these standards and principles, AT-SAT meets the technical requirements and can be further considered for use in the placement of newly hired controllers into options. These, however, are not the only considerations that need to be weighed by the FAA before using AT-SAT for placement.

Cross-Tabulation Analysis

The next step in the analysis was to cross-tabulate actual vs. hypothetical placement. "Actual Placement" was the official assignment of newly hired controllers to en route or terminal facilities without regard to their *Current* score on AT-SAT. "Hypothetical Placement" was the decision that would have been made using the *En Route* and *Terminal* scores derived from AT-SAT. There were four possible combinations of actual-by-hypothetical placements (Table 2). The cross-tabulation compared those who were hypothetically placed "correctly" or "incorrectly" in terms of their success in field training (Table 3). Placement was "correct" when the actual placement matched the hypothetical placement based on *En Route* and *Terminal* scores; placement was "incorrect" when the actual placement did not match the hypothetical placement. For example, 297 cases were incorrectly placed in the en route option that should have been placed into the terminal option based on their *En Route* and *Terminal* scores. Similarly, 881 incorrect actual placements were made into the terminal option (Table 2).

Table 4
Training Success Rates at the 1st Field Facility With and Without Placement

	Success Rate Without Placement	Success Rate With Placement
En Route (36% of positions)	77%	80%
Terminal (64% of positions)	79%	77%*
Across Options (weighted by number of positions)	78.28%	78.08%

Note. *Indicates rate adjusted for likelihood of filling 40% of terminal positions with applicants initially recommended for *En Route* placement

A second cross-tabulation was computed for those who were placed "correctly" or 'incorrectly" by their success in field training (Table 3), and the results were adjusted based on the typical proportion of hires assigned to each option (Table 4). The results of this analysis suggest that the utility of using AT-SAT for placement is marginal to slightly negative, depending on how the data are examined. The FAA could potentially see a 3% increase to 80% in the success rate of controllers "correctly" placed into the en route option, as compared to the baseline success rate (without AT-SAT guided placement) of 77%. However, this gain could be offset by a 5% reduction to 74% in the success rate of those "correctly" placed into the terminal option, as compared to a baseline success rate (without AT-SAT guided placement) of 79% (see Table 3), for a net reduction in success rates across both options of 2%. However, this loss must be reexamined and weighted within the context of the number of positions available in each option and the number of controllers being hypothetically placed in the en route option. The overall baseline success rate in terminal *without* placement is driven upwards by the higher success rate of individuals that would hypothetically have been placed in the en route option. Given the number of applicants that scored higher on the *En Route* equation, as compared with the number of positions typically available for en route controllers in recent years, it is estimated that approximately 40% of available terminal positions *could* be filled by individuals with en route recommendations. This would likely be the preferred policy, given their apparent ability to succeed in either option.

Thus, to accurately estimate the overall success rate *with AT-SAT guided placement* for terminal, given the likely situation that 40% of the positions *could* be filled by applicants scoring higher on the *En Route* equation (who would likely have higher success rate – 83% vs. 74%), a weighted average was computed. The overall success rate, assuming placement of some applicants with *En Route* placement recommendations into the terminal option then becomes 77% [(83% success rate x 40% of the positions) + (74% success rate x 60% of the positions)] instead of 74% for terminal positions. This computation results in a success rate 2% lower than the current terminal success rate seen *without using AT-SAT for placement*.

In sum, if AT-SAT is used to guide placement by option, there is a potential increase in success rates for those placed in en route of 3% but a potential decrease for those placed in terminal of 2%, for an overall 1% increase in success rates. However, this estimate must also be considered within the context of the ratio of people hired into each option. Generally speaking, because more people are hired into the terminal option (accounting for approximately 64% of open positions yearly), the decrease in the terminal success rate must be weighed more heavily in the calculation of overall success rates computed with and without placement (Table 4). Taking the higher hiring rate in the terminal option, the net effect of using AT-SAT for placement would likely be a very slight reduction in the overall success rate across both options (Table 4).

Adverse Impact Analysis

As with other employment decisions, a placement decision carries with it the potential to impact an individual's ability to earn. Given the nature of this decision, the potential for adverse impact against members of protected groups must be considered. Using data from FPPS, it was determined that en route controllers earn *on average* approximately $20K more per year than terminal controllers. The difference in annual salaries was calculated using a snapshot of the FPPS data captured in July 2012. This computation produced a very rough estimate calculated across all levels of facilities and is not intended to estimate actual losses or gains an individual controller might experience. Many other factors that could not be measured here would help determine actual losses or gains for each individual. Regardless, *on average*, receiving a recommendation for placement into the en route option would likely provide an individual with a greater *opportunity* to earn more over the course of employment and is thus considered the preferred option for calculating adverse impact.

Table 5
Adverse Impact From Placement Decision

	Hypothetical Placement			En Route Placement Rate	Adverse Impact Ratio[a]
	En Route	Terminal	Total		
By Ethnicity					
Asian	228	228	456	.50	.95
Black	713	2,324	3,037	.23	**.45**
Hawaiian-Pacific Island[b]	26	49	75	.35	**.66**
Hispanic-Latino	269	556	825	.33	**.62**
Native American-Alaskan Native	30	35	65	.46	.88
White	4,632	4,209	8,841	.52	
Multi-racial	462	569	1,031	.45	.86
No groups marked	357	358	715	.50	.95
Total	**6,717**	**8,328**	**15,045**		
By Sex					
Female	1,103	2,320	3,423	.32	**.66**
Male	5,350	5,686	11,036	.48	
Total	**6,453**	**8,006**	**14,459**		

Note. [a]Adverse impact ratio calculated with respect to whites for ethnicity and male for sex.
[b]Groups comprising less than 2% of the applicant pool are italicized. Bold ratios are less than what acceptable under the 4/5^{ths} Rule (0.80).

Using the placement rules previously described, assigning controllers to an option using their AT-SAT scores could result in differential placement rates by race and sex into the terminal and en route options (Table 5). For example, just 23% of black candidates would be recommended for placement in en route, compared to 52% of white candidates (adverse impact ratio = .23/.52, or .45, where the threshold for adverse impact is defined as a ratio of .80 or less by the *Uniform Guidelines on Employee Selection Procedures* [EEOC, 1978]). The adverse impact ratio for Hispanic/Latino applicants was .62 and for females was .66. This adverse impact would result in addition to the adverse impact these protected groups already face in assignment to the Well-Qualified category ranking for initial selection considerations.

SUMMARY

Looking at both of the concurrent validation studies and this current set of analyses together, there is sufficient evidence to suggest that the abilities required to perform air traffic control tasks do vary, to some limited degree, by option. The regression analyses (calculated repeatedly using different samples and at different times) have, in fact, derived different equations for the two options, which overlap but are not completely identical. This evidence can help provide the technical justification required, if the FAA were to pursue the use of AT-SAT for placement.

However, it is not clear that the variation by option is of a sufficient degree to justify differential placement, given the minimal utility observed. Moreover, the *utility* of using AT-SAT to guide placement is minimal – and might be slightly counterproductive for the FAA. The cross-tabulations indicated that the success rate in en route would increase if AT-SAT is used for placement but would decrease in terminal. Taken across both options, field training success rates would not likely change in a meaningful way, provided that the number of candidates typically hired for each option in recent years remains consistent.

Additionally, in both this study and the AIR® (2012) analysis, the AT-SAT equation derived from a sample of tower controllers was used to represent all of the terminal option, because no data were available examining TRACON-only controllers. Given a similar reliance on radar technology, as well as increased job complexity, ATCSs working in stand-alone TRACONs *might* be more similar to en route controllers than to tower controllers. In other words, AT-SAT subtest score relationships with performance for TRACON controllers may be more similar to those for en route than to tower controllers. If the use of AT-SAT for placement purposes were to be further pursued by the FAA, it is recommended that data be collected on TRACON-only controllers to determine first, if AT-SAT is also a valid predictor of TRACON performance in general – a highly likely result given the outcomes of previous validation studies on AT-SAT, as well as job analyses suggesting similar worker requirements. And second, if TRACON-only controllers can, in fact, be placed using the equation derived from tower controllers, or if the en route equation would be more suitable, given the similar nature of the work. It might be found that they are more accurately represented using the original en route equation, or that there are substantial differences between all three jobs, and TRACON controllers require an entirely separate equation.

Finally, placement using AT-SAT could potentially have adverse impact on individuals in protected classes. That is, members of protected classes would be placed into higher paying en route facilities at less than 80% of the rate of majority members of each class (race and gender). Differential placement rates on the basis of AT-SAT scores could create troubling pay disparities by race and sex. If the FAA were to use AT-SAT for placement, the risk of additional adverse impact and pay disparities should be evaluated against the marginal utility of placement in terms of changes in field training success rates. In sum, given the findings of both validation studies, the analyses conducted here, and the projected ratio of controllers that will likely be hired into each option, using AT-SAT scores to guide placement decisions is not recommended at this time.

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