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Age and Attitudes in the Air Traffic Control Specialist Workforce: An Initial Assessment

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16. Abstract The present study examines the relationships between air traffic control specialist age, after covarying job tenure, with perceptions of job satisfaction, quality of work life, organizational commitment, and supervisory fairness. The presence of a relationship and the shape of the relationship are examined for four categories of controllers based on air traffic option or work setting (i.e., working in an enroute, flight service stations, Level 1 to 3 or level 4 or 5 terminal (towers and tracons)). The results suggest that there is a small linear relationship between age and attitudes. Similar patterns have been found in age research in other work settings. There are some differences in the shape of the age function based on air traffic option; these differences account for minimal variance. It may be fruitful to develop a more focused study where age is measured as a continuous variable instead of using age categories, which may have masked some differences found in past research. In addition, future research may consider examining the age and attitudes relationships using international controllers to determine if there are cultural differences in the relationships found.					
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AGE AND ATTITUDES IN THE AIR TRAFFIC CONTROL SPECIALIST WORKFORCE: AN INITIAL ASSESSMENT

Organizational researchers have examined the relationship of an employee's age and a number of work-related factors, including job performance (Waldman & Avolio, 1986), career potential (Rosen & Jerdee, 1976), and work attitudes such as job satisfaction and organizational commitment (Cleveland & Shore, 1992; Rhodes, 1983). The results of that research have demonstrated a relationship between age and work-related factors that varies both in shape (linear vs. curvilinear) and size (from zero to a strong correlation), depending on the criterion of interest and contextual factors (e.g., occupation, organizational setting, and individual's health) that affect the relationship. This suggests the need for organizational researchers to carefully examine age relationships before reporting the results.

Considering the above, the present paper examines both the size and shape of the relationship between organizational attitudes and age in the air traffic control specialist (ATCS) workforce. Previous research in other job settings reviewed by Rhodes (1983) suggests a positive linear, or U-shaped relationship with age and job satisfaction and organizational commitment. However, Cleveland and Shore (1992) report the absence of a statistically significant relationship with the same variables. Consequently, this study was conducted to clarify the relationship within the air traffic control occupational setting.

For a number of years, the Federal Aviation administration (FAA) has had an interest in the job-related attitudes of its workforce (see Thompson, 1998 for a review). Recent evidence suggests that some of the work-related attitudes of FAA employees, such as job satisfaction, are higher than levels reported in previous years (Thompson et al., 1999). However, the research conducted to date has not specifically examined the ATCS workforce, nor has it identified any strong explanation for this improvement. One possibility is that the ATCS workforce has improving attitudes due to age. Most of the ATCS workforce has aged as a cohort because most were hired after the 1981 Professional Air Traffic Controllers Organization (PATCO) strike and because there

has been restricted hiring since 1992 (see Broach, 1998 for a review). This unique situation provides an opportunity to examine the relationship between age and attitudes. The relationship between age or age-related variables and air traffic controller attitudes has not been examined in the FAA, with one exception. Thompson, Hilton, and Behn (1997) found a negative relationship between organization attitudes and organization tenure for controllers in the flight service station (FSS) work setting. As such, the present study examined the relationships between ATCS age, measured in 10-year intervals, and perceptions of job satisfaction, quality of work life, organizational commitment, and supervisory fairness.

Age and Job Satisfaction. According to Rhodes (1983), research examining age and job satisfaction suggests that respondent age and perceptions of satisfaction are generally linearly and positively correlated. Some of the studies reviewed by Rhodes, however, suggest a U-shaped relationship between age and job satisfaction. Since Rhodes' review, researchers have continued to address this question (Clark, Oswald, & Warr, 1996). The important issue for the present study, however, is not the general shape of the relationship, but instead that satisfaction appears to increase with age. It is hypothesized, based on previous research with other groups, that for ATCSs, job satisfaction increases with age.

Age and Quality of Work Life. For the present study, quality of work life is an index of general satisfaction with the working environment. Rhodes' review of the age-related attitude differences also identified a small number of studies that found age to be positively related to coworker satisfaction and satisfaction with the work performed. Similar results are also reported by Kacmar and Ferris (1989) for the same constructs. As such, similar results are expected for the ATCS workforce.

Age and Commitment. Rhodes' (1983) review of the literature indicated that, except for some occupations, commitment increased with age. Several meta-analyses have found a small positive relationship between organizational commitment and age (Cohen,

1993; Mathieu & Zajac, 1990). Similar correlations have been found between age and job involvement (Brown, 1996). The correlations reported in these studies are generally less than .20, suggesting that there is a small increase in commitment to an organization or a job as an employee ages. To examine the possible confound between age and other chronological variables, such as organization or career tenure, Lynn, Cao, and Horn (1996) studied career tenure and commitment and found a small positive correlation. Career tenure is measured as years in a specific career track. Thus, research suggests that commitment to an organization increases as a workforce ages. A similar finding is, therefore, expected for ATCSs.

Age and Supervisory Fairness. There appears to be a negative linear relationship between age and perceptions of supervisors (Rhodes, 1983). However, this conclusion is based on a limited number of studies. The literature on supervisor fairness, or supervisor interactional fairness, suggests that subordinates perceive they are treated fairly when they are treated in a respectful manner and also when interactions with a supervisor are free of harassing, discriminating, and biased behavior (Bies & Moag, 1986; Folger & Cropanzano, 1998). Supervisory fairness has not been examined in relation to age; therefore, it was hypothesized that the same positive relationship found for other attitudes with age would also be found here.

METHOD

Participants

A survey (the 1997 Employee Attitude Survey) containing measures of the previously mentioned constructs was mailed to all permanent FAA employees (approximately 49,000) in the fall of 1997. Surveys were voluntarily completed and returned by 25,004 FAA employees. Of this total, 7,452 non-supervisory ATCSs between the ages of 26 and 65 returned surveys that were considered in the present study. In addition, responses across ATCS options are examined.

For the present study, four ATCS options were assessed. The first option includes ATCSs who work in Air Route Traffic Control Centers (ARTCCs), also called an "enroute center." Enroute centers provide air traffic control (ATC) services between airports.

The second option includes ATCSs who work in flight service stations. These controllers provide weather and other information important for the safety of flight to pilots. The next two options include terminal facilities. Terminal facilities provide ATC services at and around airports. In the present study, low (levels 1 to 3) and high (levels 4 and 5) traffic density terminal facilities are examined separately. Due to differences in air traffic density, runway layouts, and facility equipment, the FAA groups terminals into different levels for staffing purposes. Terminal levels are determined by air traffic density factors. Density factors are calculated by summing the total number of air traffic operations for the busiest 183 days during the previous 12-month period. The sum is then divided by 183 to obtain an average number of operations. The average is then divided by 16 (to avoid penalizing non-24-hour terminals and towers with reduced traffic during the midnight shift) to obtain the density factor. Levels 1 and 2 terminals have density factors less than 20 and restricted hours of operation. Level 3 terminals have density factors ranging from 20 to 59.99 operations per hour; level 4 terminals have density factors ranging from 60 to 99.99 operations per hour; and level 5 terminals have density factors greater than 100 operations per hour.

Measures

All measures used in the present study were administered within the context of a larger self-report survey. A single item asked for the respondent's age, measured in 10-year intervals. The age intervals were 25 and under, 26 to 35, 36 to 45, 46 to 55, 56 to 65, and 66 or older. Job tenure was assessed with a single item that asked employees how long they had worked in their current job (less than 1 year, 1 through 3 years, 4 through 9 years, 10 through 15 years, 16 through 20 years, and more than 20 years). Four attitude measures were used for the present study. First, a single item was used to measure the employees' level of overall job satisfaction. Second, the quality of work life measure consisted of five items assessing attributes of the work environment. Specifically, respondents were asked to indicate their degree of overall satisfaction with their job (same item as job satisfaction above), physical working conditions, kind of work they do, their workgroup, and the organization. For both of these measures,

overall job satisfaction and quality of work life, response options were 1 = Very dissatisfied, 2 = Somewhat dissatisfied, 3 = Neither dissatisfied nor satisfied, 4 = Somewhat satisfied, and 5 = Very satisfied. Next, organizational commitment was assessed using five items adapted from Porter, Steers, Mowday, and Boulian (1974). Response options for these items ranged from 1 = Not at all, 2 = To a limited extent, 3 = To a moderate extent, 4 = To a considerable extent, and 5 = To a great extent. Finally, supervisory fairness was assessed using five items with response options ranging from 1 = Strongly disagree, 2 = Disagree, 3 = Neither disagree nor agree, 4 = Agree, and 5 = Strongly agree (items adapted from Camman, Fichman, Jenkins, & Klesh, 1983).

RESULTS

For each attitude measure, a 4 (age: 26 to 35, 36 to 45, 46 to 55, and 56 to 65) X 4 (Air Traffic Option: enroute, FSS, Levels 1-3, and Levels 4-5) ANCOVA was conducted. Job tenure was entered as a covariate in all analyses and was significant for each analysis. When examining job satisfaction, there was a statistically significant main effect of age, $F(3, 7357) = 11.50, p < .001$ and a statistically significant main

effect of option, $F(3, 7357) = 6.23, p < .001$; however, the main effects were tempered by a significant age by option interaction, $F(9, 7357) = 2.24, p < .02$. These results are summarized in Table 1. Overall tests of linear, quadratic, and cubic trend were conducted for the main effect of age collapsing across air traffic option. While the quadratic trend fit the data, the results indicate the linear trend is the best fitting line for job satisfaction. An examination of the overall means presented in Table 1 show there is a U-shaped curve, however, the size of the differences is slight. To determine whether the linear trend fits best for each air traffic option, follow-up analyses were conducted assessing the linear, quadratic, and cubic trend for age for each air traffic option. These results, summarized in Table 1 suggest that a linear trend fit best for FSS respondents, as well as terminal respondents. However, no line fits Enroute respondents well, with the best fitting trend being cubic, but only approaching significance. The main effect of option was assessed with post hoc comparisons that indicate the enroute respondents provided significantly lower ratings of job satisfaction, compared with the remaining groups of respondents. Figure 1 shows the percent of respondents who indicated they were “satisfied” or “very satisfied” with their job. The figure shows the

Table 1. Job Satisfaction

Air Traffic Facility (Sample Size)	Means and Standard Deviations					Tests of Trend		
	26 to 35	36 to 45	46 to 55	56 to 65	Across Age	F-Linear (η^2)	F-Quadratic (η^2)	F-Cubic (η^2)
Enroute Centers (787, 1196, 348, 80)	3.60 (1.02)	3.45 (1.09)	3.53 (1.09)	3.48 (1.38)	3.51 (1.08)	0.00 (0.000)	0.06 (0.000)	3.46 (0.000)
Flight Service Stations (128, 533, 528, 133)	3.43 (1.15)	3.54 (1.11)	3.63 (1.08)	3.90 (0.99)	3.61 (1.10)	23.94** (0.003)	0.82 (0.000)	0.44 (0.000)
Levels 1 to 3 Terminals (634, 957, 257, 23)	3.76 (1.00)	3.54 (1.09)	3.73 (1.04)	4.00 (0.95)	3.65 (1.06)	3.13 (0.000)	2.77 (0.000)	1.84 (0.000)
Levels 4 and 5 Terminals (405, 1082, 277, 39)	3.68 (0.98)	3.60 (1.07)	3.60 (1.11)	3.97 (1.04)	3.63 (1.06)	4.58* (0.001)	4.44* (0.001)	0.91 (0.000)
Collapsing Across Air Traffic Options	3.66 (1.01)	3.53 (1.09)	3.62 (1.08)	3.80 (1.13)	3.59 (1.07)			

* $p < .05$

** $p < .01$

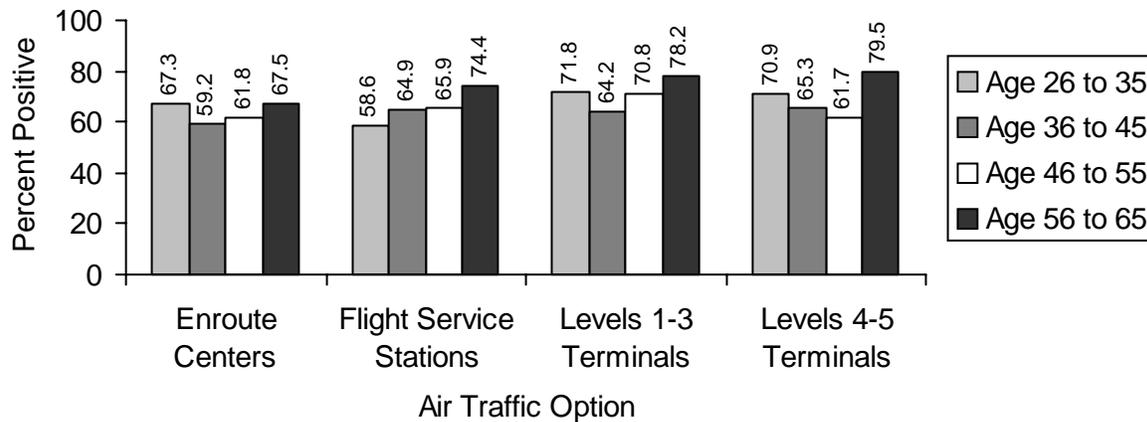


Figure 1. Percent of Respondents Indicating Job Satisfaction (Satisfied to Very Satisfied).

Table 2. Quality of Work Life

Air Traffic Facility (Sample Size)	Means and Standard Deviations					Tests of Trend		
	26 to 35	36 to 45	46 to 55	56 to 65	Across Age	F-Linear (η^2)	F-Quadratic (η^2)	F-Cubic (η^2)
Enroute Centers (790, 1195, 348, 80)	3.22 (0.76)	3.16 (0.78)	3.31 (0.84)	3.28 (0.98)	3.21 (0.79)	6.34* (0.001)	0.22 (0.000)	6.63** (0.001)
Flight Service Stations (128, 535, 526, 134)	3.27 (0.89)	3.34 (0.91)	3.38 (0.89)	3.61 (0.82)	3.38 (0.89)	31.65** (0.004)	1.34 (0.000)	0.72 (0.000)
Levels 1 to 3 Terminals (636, 962, 259, 23)	3.54 (0.78)	3.39 (0.81)	3.55 (0.81)	3.65 (0.94)	3.47 (0.80)	3.18 (0.000)	0.40 (0.000)	4.28 (0.001)
Levels 4 and 5 Terminals (405, 1085, 278, 39)	3.45 (0.76)	3.37 (0.82)	3.41 (0.87)	3.81 (0.82)	3.41 (0.81)	13.84** (0.002)	7.41** (0.001)	1.00 (0.000)
Collapsing Across Air Traffic Options	3.37 (0.79)	3.31 (0.82)	3.40 (0.86)	3.54 (0.89)	3.35 (0.82)			

* $p < .05$

** $p < .01$

trends by age for the most positive respondents for each of the air traffic options. The percent positive scores, like the test of mean differences, show that older respondents are 6 to 18 percentage points more satisfied when compared with any of the younger respondents across the options.

Similar results were found for quality of work life perceptions. There was a statistically significant main effect of age, $F(3, 7373) = 14.30$, $p < .001$, as well as a statistically significant main effect of air traffic option, $F(3, 7373) = 9.98$, $p < .001$. The age by option interaction, however, only approached statistical significance, $F(9, 7373) = 1.82$, $p = .06$. The quality of work life descriptive statistics for the main effects and the non-significant interaction are pre-

sented in Table 2. The main effect of age was assessed by computing trend contrasts. Again, the linear trend best fit the data. The main effect of option, assessed with post hoc comparisons, indicated that the enroute respondents provided significantly lower ratings of quality of work life, compared with the remaining groups of respondents. Figure 2 shows the percent of respondents who indicated they were “satisfied” or “very satisfied” with their quality of work life. As with job satisfaction, summarized in Figure 1, Figure 2 shows the trends by age and option, and only shows those with the most positive perceptions. Again, however, the older respondents are several percentage points more satisfied when compared with any of the

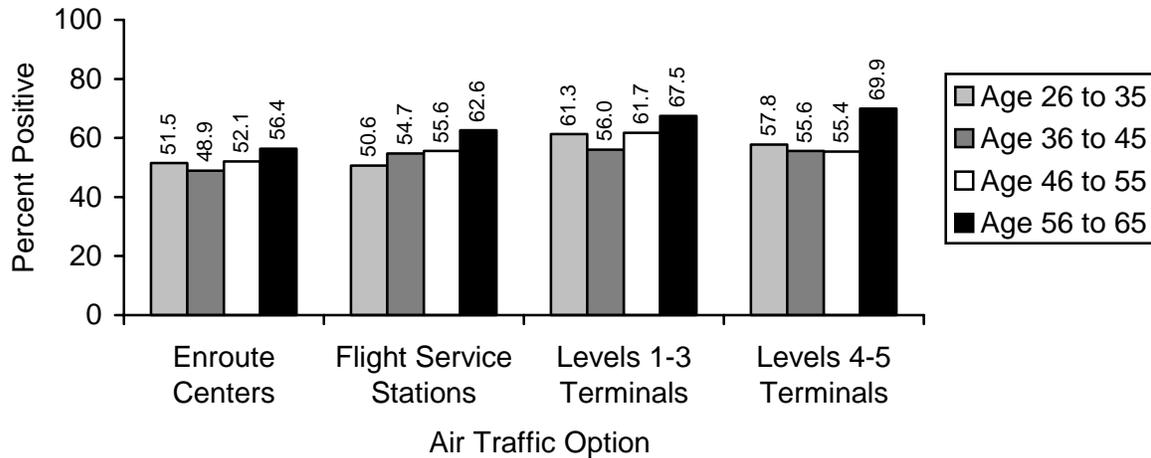


Figure 2. Percent of Respondents Indicating Satisfaction with Quality of Work Life (Satisfied to Very Satisfied).

Table 3. Organizational Commitment

Air Traffic Facility (Sample Size)	Means and Standard Deviations					Tests of Trend		
	26 to 35	36 to 45	46 to 55	56 to 65	Across Age	F-Linear (η^2)	F-Quadratic (η^2)	F-Cubic (η^2)
Enroute Centers (789, 1195, 346, 81)	2.91 (0.96)	2.79 (0.97)	3.04 (1.02)	3.28 (1.10)	2.88 (0.98)	36.03** (0.005)	3.24 (0.000)	5.62* (0.001)
Flight Service Stations (127, 532, 525, 132)	3.31 (0.86)	3.18 (0.93)	3.15 (0.99)	3.43 (0.93)	3.21 (0.95)	14.74** (0.002)	8.82** (0.001)	0.02 (0.000)
Levels 1 to 3 Terminals (633, 958, 258, 23)	3.23 (0.96)	3.00 (0.96)	3.13 (1.07)	3.58 (0.98)	3.11 (0.98)	10.16** (0.001)	5.09* (0.001)	0.54 (0.000)
Levels 4 and 5 Terminals (404, 1077, 278, 40)	3.11 (0.98)	2.90 (1.00)	3.13 (1.03)	3.64 (0.98)	3.00 (1.01)	27.14** (0.004)	11.55** (0.001)	1.19 (0.000)
Collapsing Across Air Traffic Options	3.09 (0.97)	2.93 (0.98)	3.12 (1.02)	3.43 (1.00)	3.03 (0.99)			

* $p < .05$

** $p < .01$

younger respondents. Figure 2 shows as much as a 14-percentage point difference between older and any of the younger respondents for some of the options.

The pattern of results for organizational commitment was similar to those for quality of work life perceptions. There was a statistically significant main effect of age, $F(3, 7348) = 42.92$, $p < .001$. There was also a statistically significant main effect of air traffic option, $F(3, 7348) = 14.62$, $p < .001$. The age by option interaction, however, was not statistically significant, $F(9, 7348) = 1.62$, $p = .10$. Descriptive statistics for the main effects and the non-significant interaction are for organizational commitment presented in Table 3. The main effect of age was assessed by computing trend contrasts. Here, both linear and

quadratic trend analyses fit the data, with the linear trend providing the best fit to the data. The main effect of option was assessed with post hoc comparisons that indicate the enroute respondents provided significantly lower ratings of organizational commitment, compared with the remaining groups of respondents. The organizational commitment ratings of levels 4 and 5 respondents were also significantly lower than those of FSS respondents. Figure 3 summarizes the percentage of respondents who indicated commitment to the organization "To a moderate extent" or greater. For the most committed respondents, Figure 3 shows there are sizable percentage differences for the different age groups across the air traffic option.

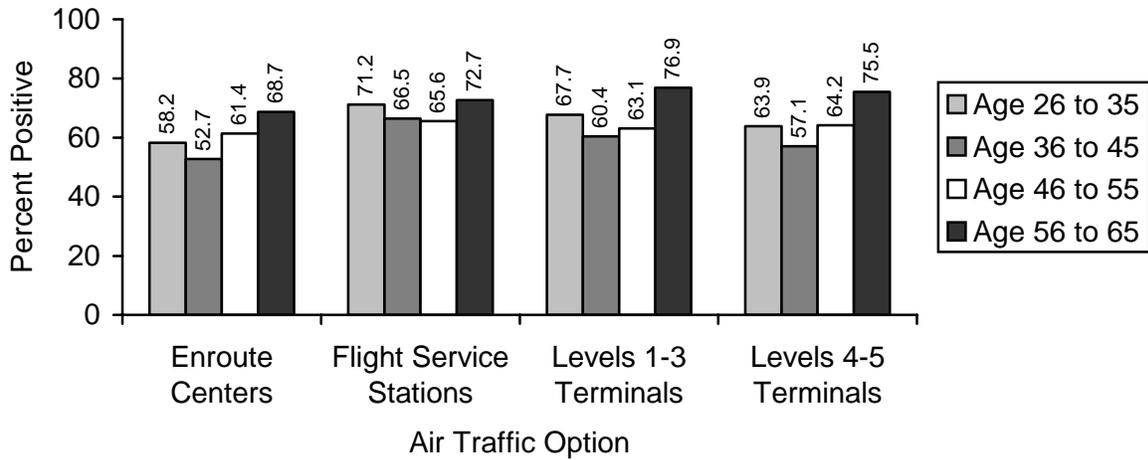


Figure 3. Percent of Respondents Indicating Organizational Commitment (Considerable Extent to a Great Extent).

Table 4. Supervisory Fairness

Air Traffic Facility (Sample Size)	Means and Standard Deviations					Tests of Trend		
	26 to 35	36 to 45	46 to 55	56 to 65	Across Age	F-Linear (η^2)	F-Quadratic (η^2)	F-Cubic (η^2)
Enroute Centers (781, 1181, 341, 79)	3.36 (1.08)	3.25 (1.11)	3.28 (1.13)	3.18 (1.17)	3.29 (1.07)	0.02 (0.000)	0.20 (0.000)	1.47 (0.000)
Flight Service Stations (128, 525, 519, 130)	3.34 (1.06)	3.19 (1.07)	3.23 (1.10)	3.49 (1.07)	3.25 (1.09)	8.76** (0.001)	6.59* (0.001)	0.07 (0.000)
Levels 1 to 3 Terminals (630, 950, 260, 23)	3.24 (1.13)	3.13 (1.15)	3.31 (1.10)	3.30 (1.09)	3.20 (1.14)	1.48 (0.000)	0.01 (0.000)	3.10 (0.000)
Levels 4 and 5 Terminals (404, 1068, 275, 40)	3.53 (1.07)	3.43 (1.09)	3.40 (1.05)	3.70 (0.88)	3.45 (1.08)	2.77 (0.000)	2.49 (0.000)	0.57 (0.000)
Collapsing Across Air Traffic Options (1932,	3.35 (1.10)	3.27 (1.11)	3.29 (1.10)	3.42 (1.08)	3.30 (1.11)			

* $p < .05$

** $p < .01$

Finally, the results for perceptions of supervisory fairness show significant main effects for age, $F(3, 7284) = 6.04$, $p < .001$, and air traffic option, $F(3, 7284) = 5.80$, $p < .001$. Table 4 presents the descriptive statistics for these main effects, as well as the interaction, even though the interaction did not approach significance. The main effect of age was assessed with analyses of trend, and a linear trend provided the best fit for the data. The post hoc means comparisons for air traffic option reveal that levels 4 and 5 respondents reported significantly higher perceptions

of supervisory fairness, compared with the other air traffic options. A summary of the percentage of respondents who indicated they “agree” or “strongly agree” with items indicating supervisory fairness is presented in Figure 4. The results in Figure 4 show that for the enroute and level 1 to 3 respondents; there are lower ratings of supervisory fairness for the oldest respondents (ages 56 to 65). However, the FSS and levels 4 to 5 respondents in the 56 to 65 category are more positive, compared with respondents in the other age categories.

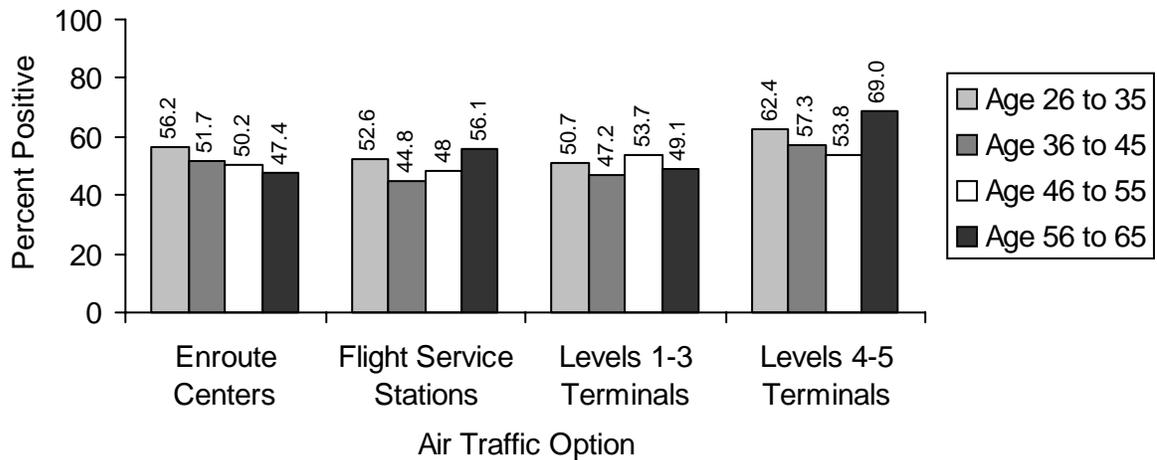


Figure 4. Percent of Respondents Indicating Supervisory Fairness (Agree to Strongly Agree).

DISCUSSION

The results of the present study must be interpreted with several caveats. First, although statistically controlled for, there are sizeable differences between the number of respondents in each of the air traffic options and in each age group. Second, by grouping respondents based on age instead of treating age as a continuous variable, potential mis-grouping may cloud some differences that actually exist for respondents of different ages. Next, the cross-sectional nature of the present study does not take into account potential cohort effects and other threats to internal and external validity. Finally, the large overall sample size may lead to excessive statistical power, which could lead to statistically significant, but practically unimportant differences between groups.

In fact, this latter caveat forces a closer examination of the results obtained. Overall, it appears that the reported attitudes of the ATCS workforce improve slightly with age. In addition, it appears that the shape of the relationship is best described as linear, with the exception of controllers working in enroute centers, where linear relationships were found only for perceptions of quality of work life and organizational commitment. For each of these analyses, however, age accounts for minimal variance in each of the dependent variables examined. Thus, the practical result of the present study is that age accounts for only minimal variance in the attitudes of the ATCS workforce when comparing averages across the entire range of survey responses. It should be noted that the effect sizes found for age and satisfaction here

are smaller than those found in other research (Bedeian, Ferris, & Kacmar, 1992; Cleveland & Shore, 1992; Kacmar & Ferris, 1989; Snyder & Mayo, 1991). However, even for many of those studies, the variance accounted for by age is small (Cohen, 1992).

It is also important to point out that for the most positive respondents, summarized in Figures 1 through 4, there are a number of sizable differences in perceptions. The differences presented in the figures were not assessed statistically, but do show that for those respondents who reported more positive perceptions, the older controllers were generally the most positive. In some cases the size of the percentage difference was quite large.

An examination of the tables shows that the average dependent variable scores for of the controllers in the age 36 to 45 category are lower than those reported by controllers in the age 26 to 35 category. These differences were not large enough to emerge as statistically significant in most cases, but suggest the general U-shaped relationship found in other research. It is possible that the absence of the very young in the present analysis (those less than age 26), which are usually included in most other research, may account for the lack of a strong U-shaped function. In addition, the small sample sizes in the 56 to 65 age category, even when statistically adjusted for, limits the efficacy of the analyses. Part of the restriction in sample size for this group is accounted for by the mandatory retirement rules for some controllers, which is further discussed below.

Given that past research has found a strong linear or U-shaped relationship between age and attitudes, it is incumbent to offer some potential reason for the limited effect found here. One possible explanation is the intentional exclusion of supervisory and management personnel from the present study. Some studies that have examined age and attitudes did not identify whether they included supervisors and managers in their samples (e.g., Lynn, Cao, & Horn, 1996; Rhodes, 1983); others specifically compared supervisors and non-supervisory employees (e.g., Cleveland & Shore, 1992). This difference in sampling may lead to a confound in age studies. Specifically, compared with non-supervisors, supervisors and managers tend to be older and tend to report attitudes that are more positive (Harris & Greenberg, 1983; Thompson et al., 1999).

Another possibility is the mandatory retirement faced by air traffic controllers who have been hired since 1972 and are in the terminal and enroute environments. Specifically, these controllers are required by the Air Traffic Controllers Career Act (1994) to cease actively controlling aircraft upon reaching age 56, unless granted an exemption. It is possible that this mandatory retirement age is a factor for the older controllers examined here. What is not clear, however, is whether the 1972 law had a positive or negative impact on attitudes. It is possible that the requirement has some negative impact on attitudes which although yielding the highest scores for the age groups in the present study, resulted in lower attitude scores when compared with attitudes of other workers in occupational groups who are not affected by such laws.

Future research should examine these possibilities. However, in the United States, there are few occupations with such early mandatory retirement rules. Moreover, a potential confound is created since the population of interest, namely air traffic controllers in the U. S., work almost exclusively for the FAA (there are some levels 1 and 2 towers with commercially contracted controllers, as well as some military controllers in the Department of Defense). As such, it may be helpful to examine the attitudes and age relationship in controllers in other countries. Multi-national research of this nature would provide interesting comparison information for a unique occupation.

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