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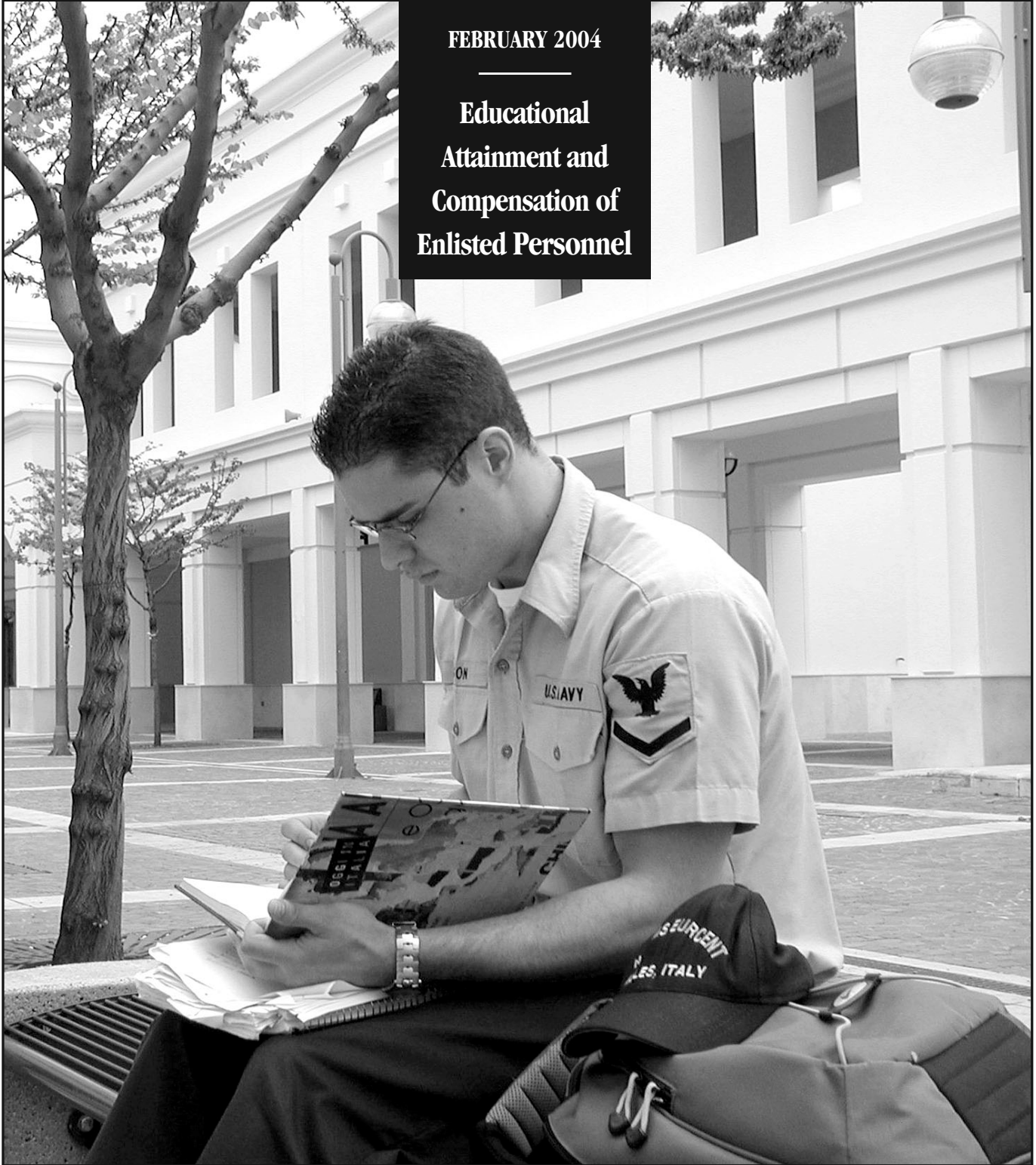
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CBO

PAPER

FEBRUARY 2004

Educational
Attainment and
Compensation of
Enlisted Personnel



Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE FEB 2004		2. REPORT TYPE		3. DATES COVERED 00-00-2004 to 00-00-2004	
4. TITLE AND SUBTITLE CBO Paper. Educational Attainment and Compensation of Enlisted Personnel				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Congressional Budget Office, Ford House Office Building 4th Floor, Second and D Streets, SW, Washington, DC, 20515-6925				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES 32	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Educational Attainment and Compensation of Enlisted Personnel

February 2004

Notes

Numbers in the text, tables, and figures of this report may not add up to totals because of rounding.

Unless otherwise indicated, all years referred to in this report are fiscal years.

The cover photo shows an enlisted member of the Navy stationed in Naples, Italy, studying for a class offered by the University of Maryland, Europe. The photo is courtesy of the U.S. Navy and was taken by Photographer's Mate 3rd Class Heather Warick.



Preface

Over the past two decades, the proportion of enlisted service members—particularly midcareer and senior enlisted personnel—with some postsecondary education has increased. The Department of Defense (DoD) has responded to that increase by awarding higher-than-average pay raises to all midlevel and senior enlisted personnel.

This Congressional Budget Office (CBO) paper—prepared in response to a request from the Senate Budget Committee—examines the basis for those targeted pay raises. It reviews trends in the educational attainment of the enlisted force and analyzes the effect of education on the retention of enlisted personnel with 3 to 17 years of service. The paper also compares total compensation for enlisted personnel (including retirement and medical benefits) with compensation for civilian workers of similar ages and levels of experience. Finally, the paper looks at alternative ways to increase the quality of the enlisted force that could be more cost-effective than targeted pay raises. In keeping with CBO's mandate to provide objective analysis, this paper makes no recommendations.

Adebayo Adedeji of CBO's National Security Division wrote the paper under the supervision of Deborah Clay-Mendez and J. Michael Gilmore. At CBO, Daniel Frisk provided valuable assistance in describing the higher education programs that DoD offers to military personnel, Chad Goldberg helped with data processing, and Carol Frost provided programming assistance for the statistical analyses. Nabeel Alsalam, Robert Dennis, Cary Elliot, Seth Giertz, Roger Hitchner, Arlene Holen, and Elizabeth Robinson of CBO offered thoughtful comments on an earlier draft, as did Glen Gotz of the Institute for Defense Analyses.

Christian Spoor edited the paper, and Juyne Linger proofread it. Maureen Costantino designed the cover and prepared the report for publication. Lenny Skutnik produced the printed copies, and Annette Kalicki prepared the electronic versions for CBO's Web site (www.cbo.gov).

Douglas Holtz-Eakin
Director

February 2004

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Educational Attainment and Compensation of Enlisted Personnel

Summary and Introduction

The educational attainment of the military's enlisted force—like that of civilian young people as a whole—is on the rise. That increase has raised concerns within the Department of Defense (DoD) about the adequacy of compensation for midcareer enlisted personnel.¹ From 2000 through 2004, such concerns led DoD to target annual raises in basic pay to those personnel (as well as to senior enlisted service members to keep their pay above that of midcareer personnel). DoD will have to budget roughly \$1.6 billion in 2004 to cover those targeted pay raises.² Additional targeted pay raises, which would increase the annual cost to \$2 billion, were in DoD's budget plans for 2005 and 2006 but have not been included in the President's budget request for 2005.

The Congressional Budget Office (CBO) has analyzed the relationship between educational attainment and retention among enlisted personnel. The analysis suggests that targeted pay raises are not necessary to support DoD's ability to compete with private employers for high-quality personnel. Although the percentage of the enlisted force with education above the high school level is rising at each pay grade and year of service, that trend may not mean that higher military pay is needed to compete with the private sector. Instead, it could indicate that rising in-kind and cash benefits have made a military career financially attractive not only to people with high school degrees but also to many with some college educa-

tion. If that interpretation is correct, the resources devoted to targeted pay raises might be freed to address other personnel concerns—including compensation for active and reserve members who are undergoing frequent or hazardous deployments.

In the future, it is possible that DoD's ability to maintain the current quality of the enlisted force could be affected by increased educational attainment in the civilian and military sectors, coupled with an improved civilian labor market and more frequent and difficult military deployments. Even in that event, however, personnel policies that focused specifically on the best performers—including people who were promoted the most rapidly—might enhance quality at a lower cost than would pay raises targeted broadly to midlevel and senior personnel.

Educational Trends and Pay Targeting by DoD

The proportion of the enlisted force with postsecondary education (some college, a two-year associate's degree, a bachelor's degree, or higher) rose from 30 percent in 1985 to 74 percent in 1999 and continues to increase. Among the most senior personnel—those in pay grades E-8 and E-9—more than half now have at least an associate's degree.

The trend toward higher educational attainment is not limited to the enlisted force. In the U.S. population as a whole, the proportion of high school graduates between the ages of 25 and 29 with at least some postsecondary education rose from 52 percent in 1990 to 66 percent in 2000.³ That trend is driven in part by increases in the pay of workers with postsecondary education relative to the pay of high school graduates.

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1. Midcareer enlisted personnel (noncommissioned officers), as defined by the Quadrennial Review of Military Compensation, are those in pay grades E-5 to E-7 with 6 to 20 years of service.
 2. A targeted pay raise is one that is greater, in percentage terms, than the pay raises provided to enlisted personnel as a whole (which currently equal the annual change in the civilian employment cost index plus 0.5 percentage points). The \$1.6 billion figure represents the difference between the current pay of midcareer and senior enlisted personnel and what their pay would have been had they not received targeted pay raises since 2000.

-
3. It is unclear whether that trend will continue among young males. The proportion of male 25- to 29-year-old high school graduates with some college education peaked at 64 percent in 1997 and declined to 63.5 percent by 2000.

DoD, consistent with the position of the Ninth Quadrennial Review of Military Compensation and other analyses, has cited those trends as grounds for providing midcareer and senior noncommissioned officers with annual pay raises that exceed those planned for the military overall.⁴ For example, Under Secretary of Defense David Chu told the Congress in 2003 that pay raises targeted to midcareer and senior enlisted personnel were necessary because “increased educational attainment on the part of the enlisted force has made the existing military pay structure less competitive.”⁵

Supporters of targeted raises do not maintain that DoD needs an enlisted force with greater formal education (although some senior leadership positions in that force are often held by people with postsecondary degrees and may benefit from the capabilities that formal education provides). Instead, they argue that in the past, when many highly capable young people did not have access to higher education, DoD could attract and retain the quality of personnel it needed without offering in-service educational opportunities or the pay that education commands in the private sector. It needed only to offer a similar pay profile to that for high-quality high school graduates in the private sector. But today, the argument goes, DoD must draw and retain personnel from a more highly educated population to meet its quality goals for the enlisted force.

DoD’s targeted raises are designed to make the cash earnings of midcareer enlisted personnel (like those of similarly educated civilians) rise more steeply with years of service.⁶ In 2004, DoD’s long-term budget plans called for continuing targeted pay raises through 2006. The goal was that by 2006, regular military compensation (RMC) for midcareer enlisted personnel would equal the wages and salaries of the 70th percentile of civilian work-

ers with similar years of work experience and some college education.⁷ (The lack of targeted pay raises in the President’s 2005 budget indicates that those plans are being deferred or possibly changed.)

The Cost of Targeted Raises

Besides their annual cost in the DoD budget, raises targeted to midcareer and senior enlisted personnel have expanded the unfunded liability of the military retirement system.⁸ The targeted raises given in 2000, 2001, and 2002 have increased that system’s unfunded liability by approximately \$5 billion (the increase resulting from the raises in 2003 and 2004 has not yet been determined).⁹ Under the current accrual system for military retirement, the unfunded liability rises when senior personnel—who are about to retire and receive pensions based on their highest three years of earnings—get percentage pay increases that exceed those for more-junior personnel.

The cost of the higher pensions for people about to retire is covered by the Treasury rather than by DoD.¹⁰ Thus, targeted pay raises are less expensive, and possibly more attractive, to DoD than they are to the federal government as a whole.

4. See Department of Defense, Office of the Under Secretary of Defense for Personnel and Readiness, *Report of the Ninth Quadrennial Review of Military Compensation*, vol. II (May 2002), available at www.dod.mil/prhome/qrmc/v2/index.htm.

5. Statement of David S.C. Chu, Under Secretary of Defense for Personnel and Readiness, before the Total Force Subcommittee of the House Armed Service Committee, March 13, 2003. In a recent interview, however, Under Secretary Chu noted that because of the “pressure of current operations,” there was growing uncertainty about targeted raises in the next year or two. See Rick Maze, “No Targeted Pay Hikes in ‘05,” *Army Times*, February 9, 2004, p. 10.

6. They could also provide an incentive for retention to more-junior personnel.

7. Regular military compensation is the sum of basic pay, allowances for housing and subsistence, and the federal tax advantage that accrues because those allowances are not taxed. For more information on the structure of military pay, see Congressional Budget Office, *What Does the Military “Pay Gap” Mean?* (June 1999); for details about the military’s noncash benefits, see Congressional Budget Office, *Military Compensation: Balancing Cash and Non-cash Benefits* (January 16, 2004).

8. The military retirement fund holds government securities that are, in effect, intragovernmental IOUs. Thus, all future military retirement costs are unfunded in the sense that they are yet to be paid by taxpayers, but there is no fund of accumulated assets that can be tapped. However, this paper uses the term “unfunded liability” as it is used conventionally in government budgeting—that is, the difference between the liability of the retirement system and the value of the government securities held, for bookkeeping purposes, by that system.

9. The \$5 billion figure is an estimate by the Congressional Budget Office based on data for enlisted personnel provided by DoD’s Office of the Actuary.

10. Accrual charges are set as a percentage of basic pay so that payments over the life of an incoming cohort of recruits are expected to cover the cost of that cohort’s eventual retirement. A large, unexpected increase in pay at the end of a cohort’s career will mean that the contributions made on behalf of that cohort will not equal the actual cost of the cohort’s retirement, increasing the liability to be paid by the Treasury.

An Alternative View of Rising Education Levels

This paper offers an alternative perspective on the implications that educational trends among enlisted personnel have for compensation. The pay of the enlisted force rose relative to that of similarly aged and experienced high school graduates in the private sector during the 1980s and 1990s.¹¹ Increases in the educational attainment of midcareer and senior enlisted personnel in recent years may be a signal not that pay must rise to be competitive but that the total level of military compensation is increasingly attractive not only to high school graduates but also to people with some postsecondary education.

The statistical analysis performed for this paper provides no evidence that among senior enlisted personnel (those with 12 to 17 years of service), postsecondary education reduces their retention. Moreover, because many senior personnel pursue additional education, the proportion of the enlisted force with postsecondary education rises sharply with both years of service and pay grade. Growth over time in the percentage of senior enlisted leadership positions held by people with associate's or bachelor's degrees could be an indication that DoD is increasingly successful in meeting its needs for high-quality, educated enlisted leaders.

Previous research by CBO questions the value of using civilian benchmarks to set military pay, given the significant differences between civilian and military life.¹² DoD's ability to meet its personnel requirements is the best indicator of whether pay is competitive, particularly in a period of conflict when more is being asked of military personnel.

Nonetheless, if pay comparisons are to be made, a comprehensive approach would take into account retirement pay and medical benefits in both the military and civilian sectors. Using such an approach, CBO finds that the cost to DoD of compensating an enlisted service member already exceeds the cost to a private employer of compensating a civilian who has some college education and is in

the 70th percentile of earnings (DoD's goal). Instead, the total employment cost of an enlisted member is comparable to that of the median civilian worker with a bachelor's degree.¹³ Moreover, although RMC is relatively flat during the midcareer years, the financial advantage of continued military service—taking into account retirement benefits—rises much more sharply than do the wages of comparable civilian workers.

Policies to Enhance the Quality of the Enlisted Force

Although senior military leaders acknowledge that the quality of today's enlisted force is unsurpassed, recruiting and retention can change quickly because of shifts in the civilian economy and in the demands that the military places on service members. In the future, DoD could have trouble maintaining the quality of its enlisted force. Moreover, as technologies and military doctrine change, it is also possible—though by no means certain—that many tasks now performed by high school graduates could require greater formal education.

Even in that case, however, setting benchmarks for military pay might not be a cost-effective practice. Analysts at the RAND Corporation, the Center for Naval Analyses, CBO, and elsewhere have identified several more-focused—and thus potentially less costly—policies that DoD might use if it needed in the future to improve the quality and performance of the enlisted force.¹⁴

One option would be to increase the importance of promotions, as opposed to longevity, in the pay table. Another would be to boost the speed at which the best-performing personnel were promoted. That approach might require increasing the percentage of E-8 and E-9 personnel in the force, as well as introducing an E-10 pay grade so that people promoted early to E-9 could still have the opportunity for career growth. Still another alternative would be to widen the range of career paths by expanding

11. See Beth J. Asch, James R. Hosek, and John T. Warner, "An Analysis of Pay for Enlisted Personnel," and James Hosek, "A Recent History of Military Compensation Relative to Private Sector Compensation," both in Department of Defense, Office of the Under Secretary of Defense for Personnel and Readiness, *Report of the Ninth Quadrennial Review of Military Compensation*, vol. II (May 2002).

12. See, for example, Congressional Budget Office, *What Does the Military "Pay Gap" Mean?*

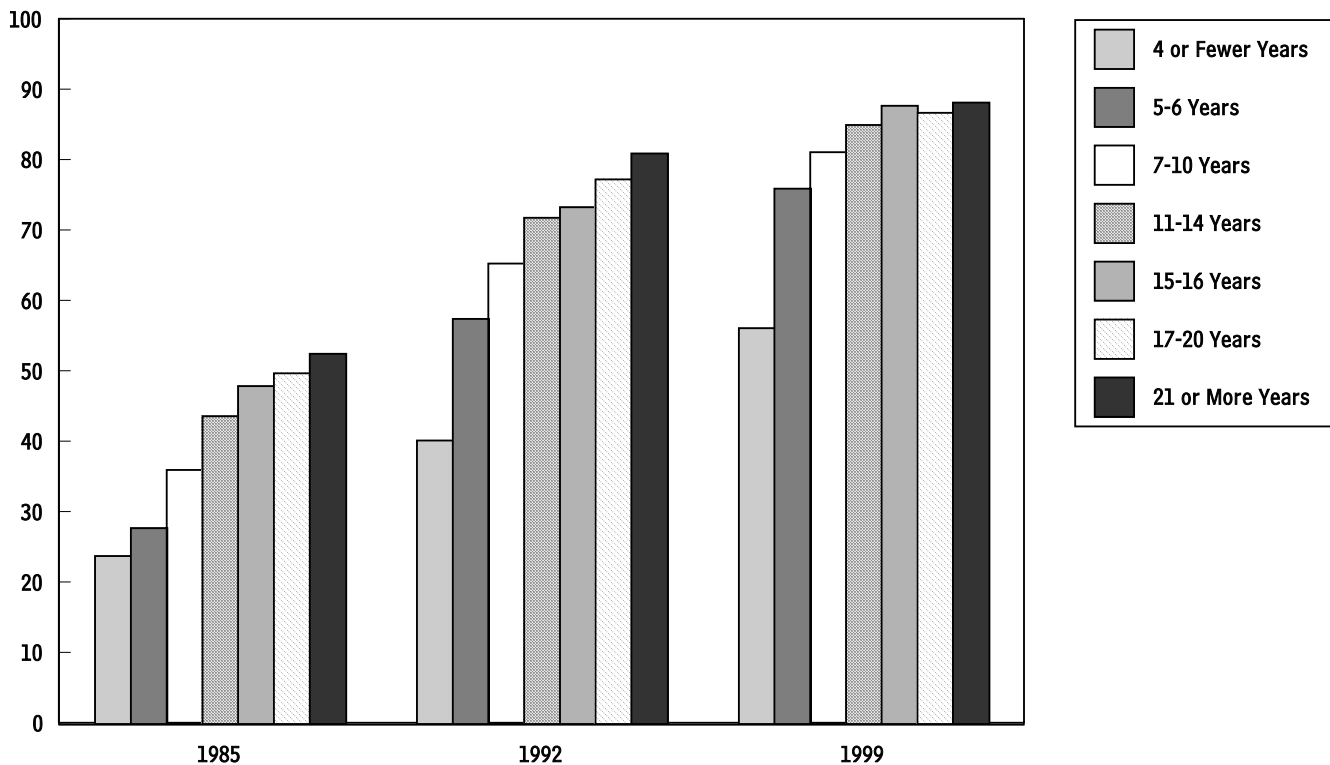
13. That employment-cost approach values retirement pay and medical benefits at their expected present discounted value. The value of retirement benefits from a service member's perspective will be much greater for those who actually reach retirement and zero for those who do not.

14. See, for example, Congressional Budget Office, *The Warrant Officer Ranks: Adding Flexibility to Military Personnel Management* (February 2002); Congressional Budget Office, *Military Pay and the Rewards for Performance* (December 1995); and Aline Quester and Sgt. Major Gary Lee (ret.), "Senior Enlisted Personnel: Do We Need Another Grade?" (briefing by the Center for Naval Analyses, December 2001).

Figure 1.

Percentage of Enlisted Personnel Who Report Having One or More Years of College Education, by Years of Service

(Percent)



Source: Congressional Budget Office based on the Defense Manpower Data Center's Survey of Active Duty Personnel, 1985, 1992, and 1999.

current programs that allow enlisted personnel to be commissioned as officers or warrant officers. Only the officer commissioning programs would be aimed directly at people with postsecondary education. Nonetheless, because education is positively correlated with job performance, all of those policies could increase the quality of the force and, incidentally, the attractiveness of the military to enlisted personnel with postsecondary education.

The Educational Characteristics of the Enlisted Force and the Impact on Retention

Educational attainment within the enlisted force is clearly rising (see Figure 1). However, the statistical evidence about the impact of rising education on the retention of enlisted personnel is inconclusive.

Trends in Educational Attainment

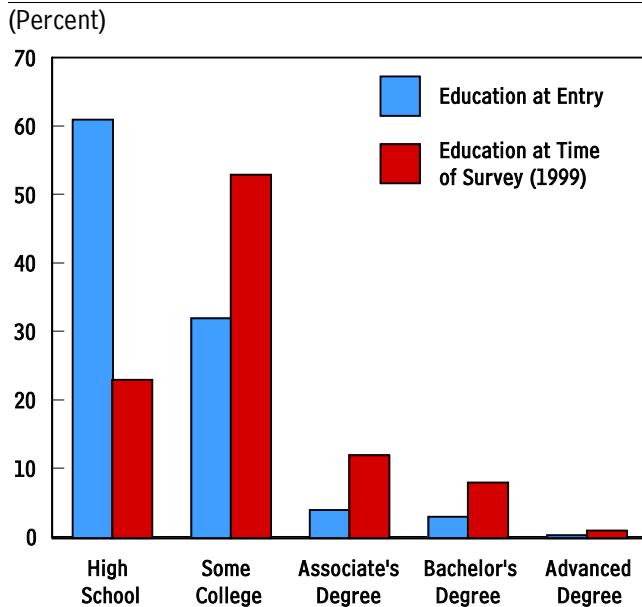
The enlisted force is far more educated today than it was two decades ago. In 1985, 30 percent of all enlisted personnel had one or more years of college education. By 1999 (the most recent year for which reliable survey data are available), that share had more than doubled to 74 percent—53 percent with some college credits but no degree, 12 percent with associate's degrees, 8 percent with bachelor's degrees, and 1 percent with advanced degrees.

Many of today's enlisted personnel gained their postsecondary education while on active duty. About 60 percent of enlisted personnel surveyed in the Defense Manpower Data Center's 1999 Survey of Active Duty Personnel reported having no more than a high school-level education when they began their military service.¹⁵ By the time of

15. The services' recruiting records indicate that at least 90 percent of new recruits have a high school-level education. However, the 1999 survey data indicate that many of those recruits also have at least some college credits.

Figure 2.

Change in the Educational Attainment of the Enlisted Force Since Entering the Service



Source: Congressional Budget Office based on the Defense Manpower Data Center's 1999 Survey of Active Duty Personnel.

the survey, however, only 23 percent remained at that level (see Figure 2). The armed services offer enlisted members a variety of education benefits, some of which can be used after leaving the military and some of which can be used while serving (for more details about those benefits, see Box 1). The ability to gain education while on active duty means that educational attainment generally rises with years of service (see Figure 1). It also rises with pay grade (see Figure 3 on page 8). For example, although 50 percent of enlisted personnel with more than 20 years of service have at least an associate's degree, the figure for the subset of E-9 personnel with more than 20 years of service is 60 percent.

The Relationship Between Education and Retention

The implications of those trends depend in part on the effect that education has on the retention of high-quality military personnel. Some enlisted members who obtain postsecondary schooling will leave the military to take advantage of their increased civilian opportunities or to finish their education using the Montgomery GI Bill. At the same time, however, the military's efforts to increase in-service education benefits could attract some high-quality personnel who value those opportunities and who might

choose to remain in the military to take advantage of them.¹⁶

To provide some insight into the association between education and retention, CBO conducted a statistical analysis of the retention decisions of three groups of service members—early-career enlisted personnel (those with 3 to 6 years of service), midcareer personnel (7 to 11 years of service), and senior personnel (12 to 17 years of service). For each group, CBO used logit equations to estimate the probability that individuals nearing a decision point for reenlistment would remain in the military. The analysis employed a specially constructed data set from the Defense Manpower Data Center that combined survey and administrative data (see Box 2 on page 9). Sample sizes for the groups ranged from about 500 to 900.

The analysis controlled for the effects on reenlistment behavior of a wide range of personal characteristics, including race, sex, and whether the individual was in an exceptionally high pay grade given his or her years of service. However, the primary purpose of the analysis was to determine whether service members with postsecondary education—some college course work, an associate's degree, a bachelor's degree, or higher—were more or less likely to leave the military than otherwise similar members with no more than a high school education. The analysis was also designed to determine whether acquiring that education while on active duty, as opposed to before enlistment, had any impact on retention.

CBO found that in the case of personnel with 12 to 17 years of service, there was no meaningful statistical evidence that education had any effect on retention. (The education coefficients in the equation were all statistically insignificant and had a mix of positive and negative signs; see Table A-2 in the appendix.) That result was expected given that for personnel with those years of service, the prospect of retirement benefits offers a strong incentive for reenlistment.

For personnel with 7 to 11 years of service, there was limited evidence that those with postsecondary education—about 80 percent of the members with those years of service—are less likely to remain in the military than otherwise similar individuals. (In the equation for that group, five of the six coefficients on the education variables were

16. See Federico E. Garcia, Capt. Ernest H. Joy, and David L. Reese, *Effectiveness of the Voluntary Education Program*, CRM 98-40 (Alexandria, Va.: Center for Naval Analyses, April 1998).

Box 1.**Voluntary Education Benefits for Enlisted Personnel**

Enlisted personnel in the Army, Navy, Air Force, and Marine Corps receive a number of voluntary education benefits. Those benefits can be broadly classified as tuition-support programs or credit-conversion programs. Tuition-support programs help defray the cost of education before, during, or after active duty. Credit-conversion programs enable enlisted personnel to use courses, occupational training, and on-the-job skills as credit toward a college degree or vocational certificate. Some of the major examples of both types of programs are described below.

The best-known education assistance program is the Montgomery GI Bill (MGIB). Administered by the Department of Veterans Affairs, the GI Bill provides 36 months of education assistance to participants, up to approximately \$1,000 per month. Although active-duty personnel can participate in the program, most MGIB funds go to military veterans. MGIB benefits can be used for degree and certificate programs, flight training, apprenticeship or on-the-job training, license and certification tests, and correspondence courses. When used in conjunction with MGIB, the service college fund (“kickers”) programs currently offered by the Army, Navy, and Marine Corps provide up to about \$50,000 in total assistance. (Kickers are enlistment incentives designed to attract qualified personnel for critical and hard-to-fill occupational specialties.) In 2002, more than 320,000 veterans and service members trained under the GI Bill.

The mainstay of education benefits during active duty is the Military Tuition Assistance (TA) program. The same for all of the services, TA provides tuition and fee assistance for voluntary, off-duty college courses and degree programs. Participants are restricted to a maximum of \$250 per semester unit of tuition assistance, or up to \$4,500 of aid per fiscal year. Twenty percent of the active-duty force used TA benefits in 2002. MGIB participants are also eligible for the Tuition Assistance Top-Up Program, in which the Department of Veterans Affairs pays tuition and fees not covered by TA, up to the monthly MGIB benefit. More than 30,000 service members received benefits under Tuition Assistance Top-Up in 2002.

For active-duty personnel with existing college debts, the Army, Navy, and Air Force offer loan repayment programs to assist in paying off federally insured student loans. Payment details vary by service. For example, the Army pays either one-third of a participant’s debt or \$1,500—whichever is greater—for each year of service (a three-year enlistment is required).

Because of frequent relocations, active-duty enlisted personnel may have trouble using tuition-support programs to the full extent possible. To alleviate residency requirements, DoD created the Servicemembers Opportunity Colleges (SOC) program. SOC comprises about 1,700 colleges and universities that offer associate’s, bachelor’s, and graduate-level degrees to service members. The schools agree to

negative, and two of the six were statistically significant, albeit weakly). For that particular sample, acquiring a bachelor’s degree while on active duty was associated with a reduction of 35 percentage points in the probability of reenlistment, compared with similar individuals who had only a high school degree (see Table 1 on page 10).¹⁷ Service members who earned a bachelor’s degree or higher

while on active duty account for just 3 percent of enlisted personnel with 7 to 11 years of service, but they make up 8 percent of the people in that group who receive exceptionally rapid promotions and thus might be considered the best performers.¹⁸ Moreover, further investigation

17. Because of the large standard error, the true effect of education could be much lower or higher than indicated by the estimated coefficient.

18. Another 3 percent of people with those years of service had acquired a bachelor’s degree or higher before entering active duty, but the estimated effect on retention of entering with a bachelor’s degree, although negative for those years of service, was not statistically significant.

Box 1.**Continued**

transfer credits among themselves, so enlisted personnel do not have to retake coursework if their duty station changes. SOC coordinates degree programs for the Army (SOCAD), Navy (SOCNAV), and Marine Corps (SOCMAR). Participants must develop a degree plan and complete at least 25 percent of their degree requirements with their designated “home” college.

Although SOC courses are generally taught in a traditional classroom setting, distance learning is possible within the SOC network. The Army’s eArmyU program enables enlistees to complete coursework entirely over the Internet. The Navy College Program for Afloat College Education (NCPACE) allows Navy and Marine personnel to take courses via paper correspondence, CD-ROM, video teleconferencing, and the Internet. NCPACE also brings instructors on board Navy ships.

Tests and military schools are other means of earning college credits. The Defense Activity for Non-Traditional Education Support (DANTES) administers a range of examinations for credit and for admission to college or graduate school. Exams available at no cost to service personnel include College Level Examination Program (CLEP) general exams, CLEP subject exams, the DANTES Subject Standardized Tests (DSST) program, Regents College exams, and others. More than 212,000 tests were administered to active-duty, Reserve, and National Guard personnel in 2002. Military coursework and occupational spe-

cialty training relevant to individual degree requirements can also count as credit. The American Council on Education evaluates many military courses for credit, although colleges have the final say on whether to accept those credits.

The Air Force does not have a college fund or a specific SOC program. Instead, it operates the Community College of the Air Force (CCAF), an accredited two-year college that allows Air Force personnel to earn associate’s degrees in such fields as aircraft and missile maintenance, electronics and telecommunications, allied health, logistics and resources, and public and support services. As in the SOC program, credits toward a CCAF degree can be accumulated at Air Force advanced training schools, at colleges that offer accredited courses, and through credit by examination.

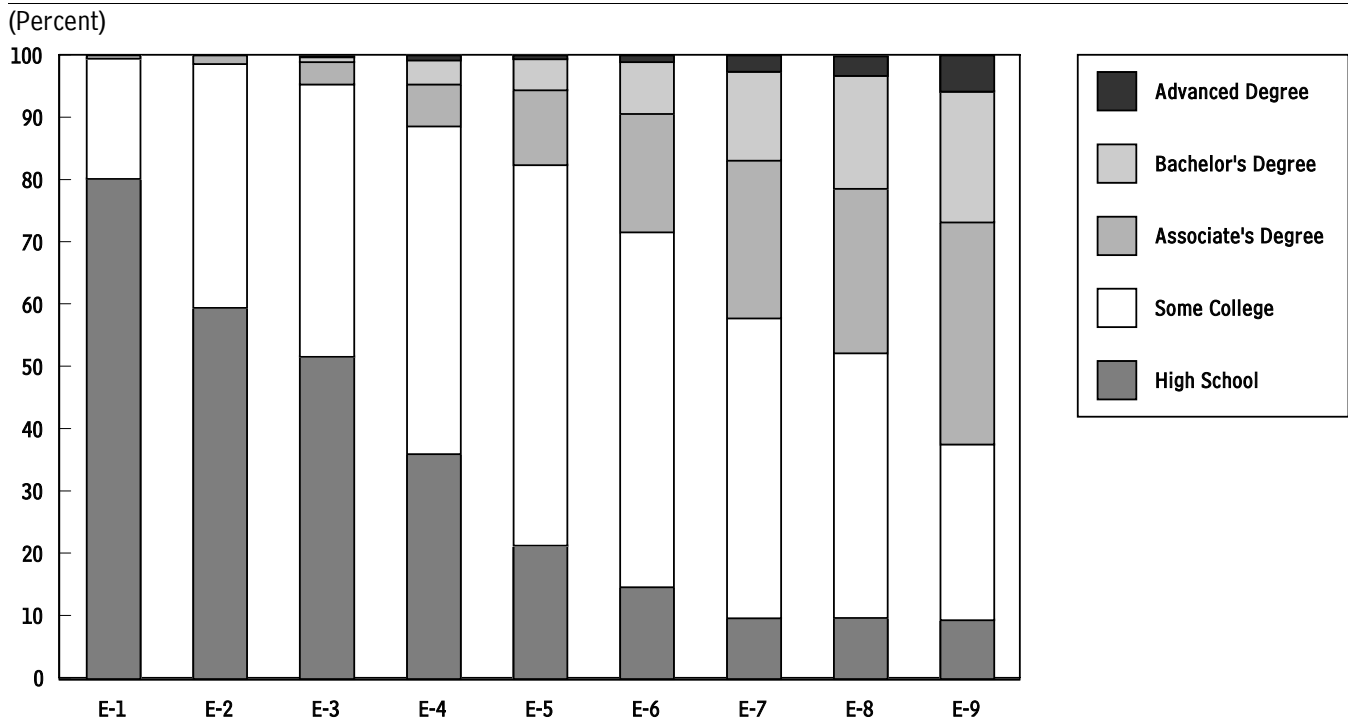
For vocational education, the military’s Certification Program enables enlisted personnel to earn certification in a specialized technical field on the basis of military training. A number of national trade associations—in fields such as broadcast engineering, medical technology, food preparation, and automotive repair—have agreements with DANTES to recognize military training and certification exams. Service-specific certification programs include the Army’s Credentialing Opportunities On-Line (COOL) program and the Navy’s United Services Military Apprenticeship Program (USMAP).

reveals that of the personnel with bachelor’s degrees and 7 to 11 years of service who opted to remain in the military, 18 percent became warrant officers or commissioned officers within three years (compared with 4 percent of all personnel in those years of service who reenlisted). Although those service members stayed in the military, they may not have considered the pay track for enlisted personnel attractive.

The relationship between education and reenlistment is less clear among personnel with 3 to 6 years of service.

The only statistically significant finding for that early-career group was that the 3 percent who earned an associate’s degree while on active duty were 25 percent less likely to remain in the military than otherwise similar service members. One explanation could be that many of the people who earn an associate’s degree in their first term of service have a strong interest in higher education and plan to leave the military to use their GI Bill benefits.

Overall, this analysis provides some limited support for the view that military personnel with 3 to 11 years of ser-

Figure 3.**Education and Pay Grade in the Enlisted Force**

Source: Congressional Budget Office based on the Defense Manpower Data Center's 1999 Survey of Active Duty Personnel.

vice and some higher education—particularly those who earn an associate's or bachelor's degree while on active duty—find a full enlisted career less attractive than do other enlisted personnel. Yet because of the relatively small percentage of members with those years of service who receive such degrees (rather than simply complete some college courses), that finding does not mean that DoD is unable to retain sufficient numbers of high-quality personnel—with or without higher education—to meet its needs for more-senior personnel.

This analysis could, however, raise some questions about the effectiveness of in-service education programs as a tool for retention.¹⁹ But even if such programs have a negative effect on retention, they may be desirable for other reasons. They may provide society with a better-educated workforce and meet a perceived obligation to

encourage young recruits to make the most of their capabilities. In addition, an association between education and low retention does not necessarily mean that one causes the other. It may be that many of the people who currently seek education while in the military are members of a self-selected group with little interest in a life-long military career. In that case, a policy of encouraging enlisted personnel who might not otherwise take advantage of in-service education to do so could still have a positive effect on their retention.

The Rewards to Education in the Military and Private Sector

CBO's analysis does not indicate that rising educational attainment in the enlisted force is affecting DoD's ability to retain the high-quality personnel it needs. Nevertheless, the returns on postsecondary education in the enlisted ranks are limited. In the civilian economy, people who earn academic degrees can move on to new positions that involve greater responsibilities, a wider range of skills, and significantly higher pay. In the military, positions that command the pay associated with higher aca-

19. Other studies have found different results than this analysis. For evidence that the Navy's in-service Voluntary Education (VOLED) program, which provides sailors with opportunities for off-duty postsecondary education, has a positive effect on retention, see Garcia, Joy, and Reese, *Effectiveness of the Voluntary Education Program*.

Box 2.**Data Used in CBO's Retention Analysis**

Most analyses of military retention are conducted using administrative records that contain information about individual military personnel, such as rank, age, sex, and dates of entry or departure from military service. However, some of that information—including details about the individual's highest educational attainment—is not used for official purposes; thus, it may not be updated as changes occur and is often inaccurate. That inaccuracy has hampered efforts to identify trends in educational attainment among the enlisted force and the relationship between education and retention.

The Congressional Budget Office's analysis is based on data provided by the Defense Manpower Data Center that combine survey information on the educational attainment of 15,000 enlisted personnel (derived from the 1999 Survey of Active Duty Personnel) with administrative records for those individuals, including exits from military service. That combination of survey and administrative data may provide a more accurate basis for analysis. (More information about the data set can be found in the appendix.)

demographic degrees are typically held by officers; enlisted members with higher education receive almost the same earnings as other enlisted personnel with the same years of military service.

That limitation could make military service less attractive to young enlisted personnel with college degrees. But even so, under promotion policies in which years of service play a major role, targeting pay raises to all midcareer and senior enlisted personnel will do little to increase the returns on education in the military. Moreover, under the current system of military retirement, the financial benefits of continuing to serve rise steeply for all midlevel and senior personnel approaching 20 years of service. For those personnel, military compensation exceeds the compensation of the 50th percentile of civilians with bachelor's degrees. Thus, for midcareer and senior personnel, the financial returns from continued military service—although largely independent of educational attainment—may still be greater than the returns from civilian work.

How the Military Rewards Education

In the armed forces, where basic pay is determined by rank and years of service, the financial rewards that enlisted personnel receive for acquiring postsecondary education depend on the impact that education has on their speed of promotion. The services give only limited direct weight to education in determining promotions (for details about the promotion process, see Box 3 on page 11).

Nonetheless, education will contribute to more rapid promotions—and thus to higher pay—if it makes people more productive in their current jobs or adds to their potential for growth. In addition, even if education by itself does not make enlisted personnel more valuable to the military, it will be associated with rapid promotion to the extent that it is correlated with other characteristics—such as initiative and commitment—that are rewarded by promotion.

An analysis of data from DoD's 1999 Survey of Active Duty Personnel indicates that the more formal education enlisted members have, the more likely they are to be among those with the fewest years of service for their pay grade and branch of service. For example, 29 percent of enlisted personnel with a bachelor's degree or higher can be considered "fast trackers"—people who have relatively few years of service given their pay grade—compared with only 9 percent of enlisted personnel who have no more than a high school education (see Figure 4 on page 12).²⁰

20. For that analysis, fast trackers are defined as people in the lowest percentiles of years of service for their pay grade. The cutoff for fast trackers was as close to the 10th percentile as possible (that is, 90 percent of the personnel in that pay grade had more years of service). However, cutoffs as high as the 15th percentile were necessary in situations in which more than 10 percent of personnel were in the lowest years of service for their pay grade.

Table 1.**The Effect of Education on the Probability of Staying in the Military**

CBO's Analysis	Enlisted Personnel with		
	3-6 Years of Service	7-11 Years of Service	12-17 Years of Service
Number of Personnel in Sample	890	470	525
Base Retention Rate of Personnel in Sample (Percent)	45	73	93
Number with High School Education	321	111	84
Percentage-Point Difference in Retention Rate for Personnel with Postsecondary Education			
Some college	+1	-10*	0
Number in sample	(469)	(269)	(289)
Associate's degree	+14	-14	-3
Number in sample	(65)	(58)	(92)
Bachelor's degree or higher	-14	-12	+12
Number in sample	(35)	(32)	(60)
If "some college" is acquired while in the service	+7	+7	+1
Number in sample	(217)	(157)	(184)
If associate's degree is acquired while in the service	-25**	-10	+3
Number in sample	(29)	(41)	(80)
If bachelor's degree is acquired while in the service	+11	-35*	+99 ^a
Number in sample	(10)	(12)	(46)

Source: Congressional Budget Office.

Note: * = statistically significant at the 90 percent level; ** = statistically significant at the 95 percent level.

a. The coefficient of this variable (bachelor's degree or higher) in the statistical analysis for this group has a very large standard error. The coefficient is not significant in a statistical sense. (For more details, see Table A-2 in the appendix.)

Faster promotion notwithstanding, the advantages of rank enjoyed by enlisted personnel with higher education are relatively small, especially when expressed in dollar terms. On average, enlisted personnel in a given year of service with an associate's degree earn only about \$1,000 more per year in regular military compensation than a similar enlisted member with a high school education (see Figure 5 on page 13). In contrast, the returns from a two-year associate's degree in civilian employment begin at \$9,000 a year and rise with experience.²¹

Enlisted and Civilian Compensation for People with Different Levels of Education

Although education is not well rewarded in the enlisted force, members with postsecondary education may still see a financial advantage to remaining in the military. De-

21. That figure is based on data from the Bureau of Labor Statistics' Current Population Survey. It represents the difference between the average earnings of men ages 18 to 59 years (with various levels of experience) with an associate's degree and the average earnings of those with only a high school education.

Box 3.**The Role of Postsecondary Education in the Promotion Process for Enlisted Personnel**

The policies and practices that determine the effect of education on promotion vary among the services. In general, additional education beyond the high school level is not a requirement for promotion to any of the enlisted ranks. However, higher education does play a role—sometimes subjectively and sometimes as part of a quantitative point system. But its weight is small relative to the total value of all of the factors considered in a promotion.

The process for senior enlisted personnel typically involves convening a promotion board, which evaluates eligible personnel according to a number of criteria—most significantly, job performance. The board usually considers education in a subjective manner. For ranks E-6 to E-9, Marine Corps boards consider education as part of the “whole Marine” concept. Although job performance is the most highly regarded element in a Marine’s promotability, higher education can enhance a person’s chances of promotion, provided that he or she is competitive with other candidates. Similarly, Army promotion boards for ranks E-7 to E-9 often view higher education as a desirable qualification. The situation is similar in the Air Force. For their part, Navy officials say that job performance and other objective criteria are typically enough to distinguish between candidates for promotion, so education seldom comes into play.

For midlevel enlisted personnel, the services usually employ point-based systems, which assign a fixed

number of points to the factors under consideration. In those systems, higher education is explicitly considered along with more traditional factors such as job performance and test scores on military subjects. But there too, education receives a lesser weight than job-related factors. For example, Marines eligible for promotion to grades E-4 and E-5 receive 10 points for each college course (of three credit hours) and 15 points for each course taken at the Marine Corps Institute, up to a maximum of 100 points. That maximum represents about 6 percent of the total 1,500 to 1,700 points typically needed for promotion. The Army, in deciding on promotions to grades E-5 and E-6, awards 1.5 points for each college credit hour earned and another 10 points for degree completion. Those education points can add up to 100 points out of a total possible 800 points needed for promotion. The Navy does not award direct points for higher education in the promotion process for its midgrade enlisted personnel (E-4 to E-6). However, higher education is recorded in evaluation reports and may be accorded some value when the candidate is assessed in areas such as professional knowledge and personal initiative.

The promotion process for junior enlisted personnel (up to E-3 for most services) is more automatic, with the essential requirements being length of time in the service and in the current pay grade. Promotion boards or point systems are not used for those grades.

pending on how many years of service the member has, higher education may mean only that the financial advantage of military service over civilian employment is smaller than it otherwise would be.

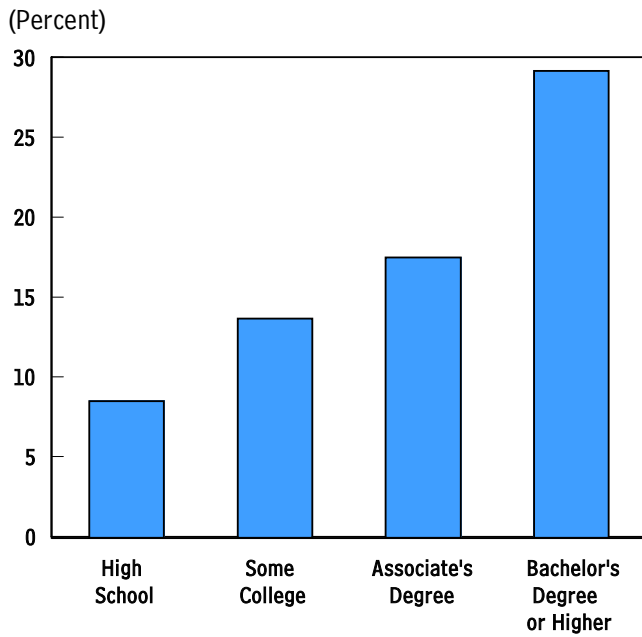
Costs from the Perspective of Employers. One way to compare military and civilian compensation is to look at how much the total package of compensation costs an

employer. That cost captures retirement and medical benefits as well as salaries and wages.²²

22. Total employee compensation costs for both DoD and private employers include other benefits such as dependent education, child care, food, and recreation subsidies. This comparison excludes such benefits, which are difficult to estimate and which account for a small share of the total cost of benefits.

Figure 4.

Percentage of Enlisted Personnel Who Are “Fast Trackers,” by Highest Level of Education Attained



Source: Congressional Budget Office.

Note: Personnel are “fast trackers” if they have fewer years of service than 90 percent of the service members in their pay grade (in other words, they are in the 10th percentile in terms of years of service).

In the private sector, a large employer contributes, on average, 6 percent of an employee’s salary to a retirement plan and about \$2,500 per single worker or \$6,000 per family annually to the cost of medical insurance.²³ Although the total cost of noncash benefits is more difficult to evaluate, the Bureau of Labor Statistics estimates that such benefits account for roughly 31 percent of the cost of compensation for large private employers.²⁴

In the case of military personnel, noncash benefits (including those paid by the Department of Veterans Affairs) account for almost 60 percent of the total cost of military compensation to the federal government.²⁵ As part of those noncash benefits, DoD contributes 27 per-

23. Department of Labor, Bureau of Labor Statistics, *Employer Costs for Employee Compensation*, (June 2003); and Kaiser Family Foundation and Health Research and Educational Trust, *2002 Employer Health Benefits Survey* (Menlo Park, Calif.: Kaiser Family Foundation, 2002).

cent of basic pay to cover the cost of accruing retirement benefits for active-duty personnel, pays an average of \$10,000 per active-duty service member for the medical costs incurred by such members and their families, and provides retiree medical benefits that, if fully funded on an accrual basis, would cost an additional \$8,400 per active-duty service member each year. Military retirement benefits are not vested before 20 years of service, which means that a minority (less than 20 percent) of enlisted personnel in each cohort of recruits ever receive retiree benefits. That situation makes the allocation of those benefits among active-duty personnel at different years of service arbitrary. Nonetheless, because the accrual charges paid on behalf of personnel who do not retire are needed to cover the benefits of those who do, those charges are part of the average cost of military personnel from DoD’s perspective.

Factoring in the accrual costs of medical and pension benefits for retirees, the federal government pays more for an enlisted service member than a private employer pays for a worker with an associate’s degree and earnings in the 70th percentile for such workers (see the top panel of Figure 6 on page 14).²⁶ Indeed, the cost of the typical enlisted member is roughly equivalent to the cost of the median civilian with at least a bachelor’s degree. The difference in total employment costs for enlisted personnel and private-sector workers of similar education levels, taking into account retirement and medical costs, is significantly greater than the difference in salaries and wages (see the bottom panel of Figure 6).

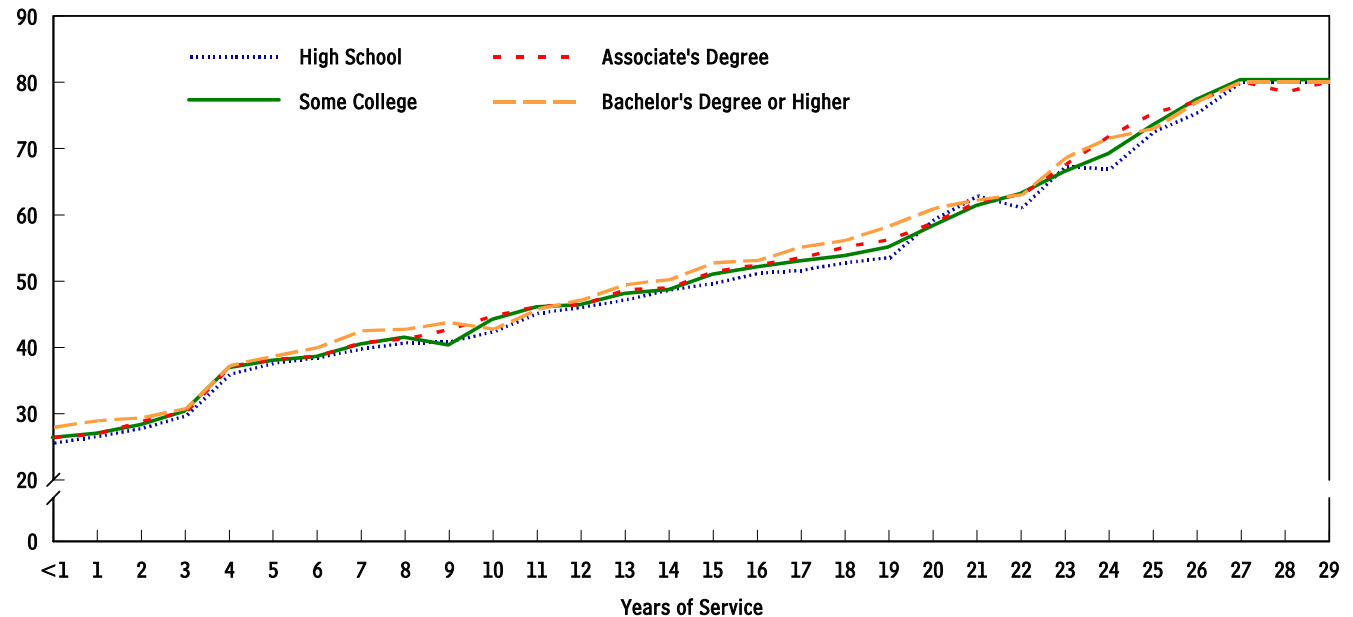
24. Department of Labor, *Employer Costs for Employee Compensation*. That figure is for employers with 500 workers or more. The percentage for all employers is 28 percent. The benefits in that calculation include legally mandated benefits, such as employers’ contributions to Social Security, unemployment insurance, and workers’ compensation. They also include paid leave (vacation, holiday, sick, and other leave).

25. See Congressional Budget Office, *Military Compensation: Balancing Cash and Noncash Benefits*. The calculation for military non-cash benefits includes legally mandated benefits but excludes paid leave.

26. For the comparisons in this paper, CBO calculated the cost of enlisted personnel using the career path of the “typical” enlisted member, based on historical data. That typical member attains the rank of E-3 by the second year of service, E-4 at the fourth year, E-5 at the eighth year, E-6 at the 14th year, and E-7 at the 20th year. (The vast majority of enlisted personnel retire at the rank of E-7, although a select few reach E-8 and even fewer reach E-9.)

Figure 5.**Average Earnings of Enlisted Personnel, by Highest Level of Education Attained and Years of Service**

(Thousands of 2003 Dollars)



Source: Congressional Budget Office.

Note: Earnings denote regular military compensation, which is the sum of basic pay, allowances for housing and subsistence, and the federal tax advantage that accrues because those allowances are not taxed.

Compensation from the Perspective of the Enlisted Service Member. The fact that the cost of an enlisted service member to DoD is greater than the cost of a worker with an associate's degree (and 70th percentile earnings) to a private employer does not necessarily mean that military service is more attractive than civilian employment. Depending on an individual's preferences, military pay may need to be higher to compensate for the hazards and hardships of military service. In addition, although military personnel value in-kind and deferred benefits, in many cases that value is less than what DoD pays to provide the benefits.²⁷

Although the nonpecuniary aspects of military service are hard to quantify, analysts have developed techniques to compare the financial advantage of military service (including the value of deferred retirement pay) over civilian employment for service members with different levels of

education and at different points in their careers. Since the 1970s, the models most widely used to predict retention among enlisted personnel—and to characterize the relative financial benefits of military and civilian employment—have taken into account the lifetime annuity that military service provides to relatively young retirees. Recognizing that each additional year of service entails nonpecuniary benefits or costs, those models compare military service and civilian employment not only by looking at the difference in the present discounted value of future earnings (discounted at a high individual rate) but also by looking at that difference spread out, or annualized, over the years of service required to obtain them. (For a description of that approach, see Box 4 on page 15.)²⁸ Such models predict the retention behavior of career personnel much better than do models that focus

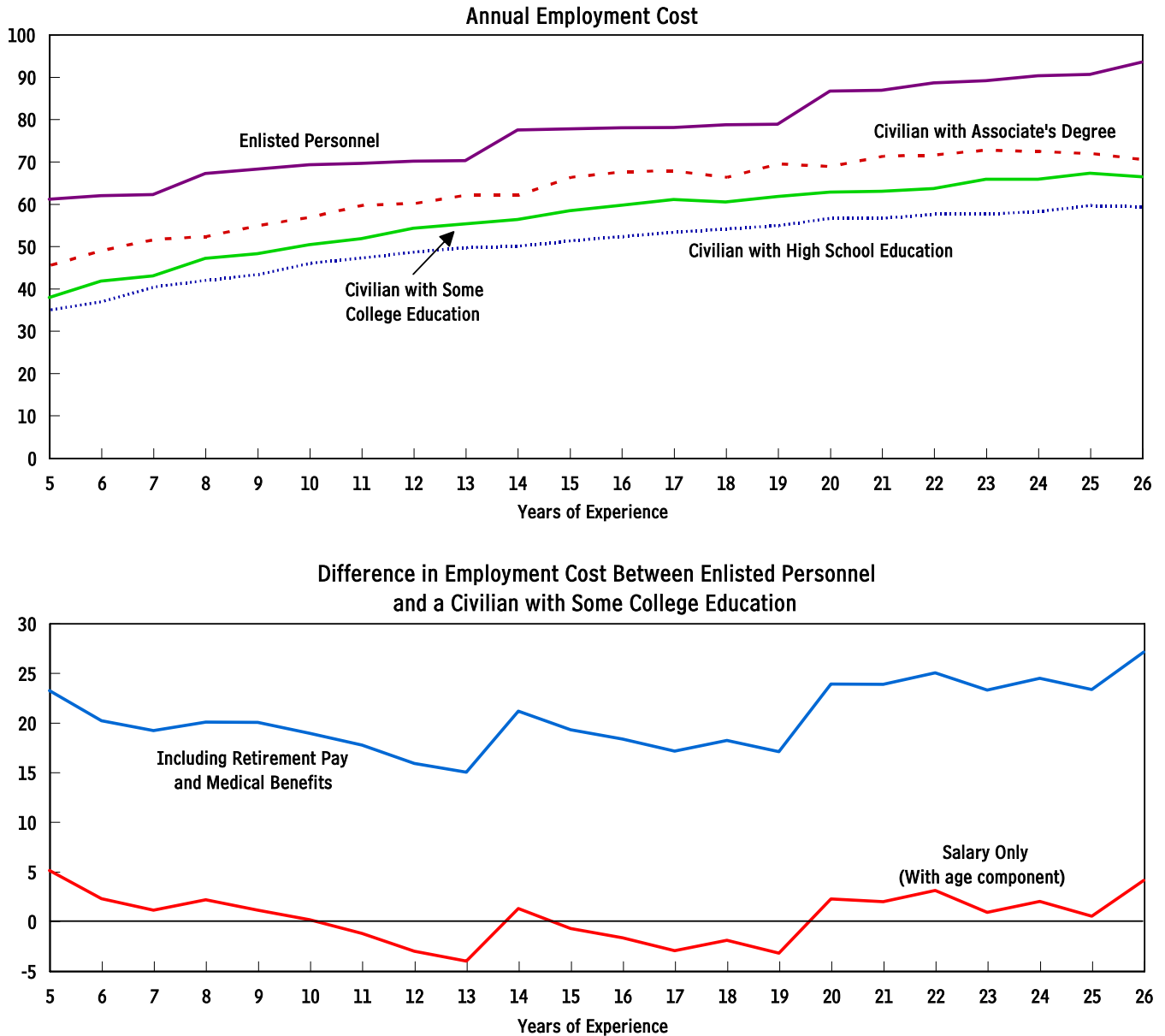
27. For example, a service member living off-base may have no preference between shopping at an on-base commissary or at a commercial supermarket. Nevertheless, if the member does shop at the commissary, DoD incurs a subsidy cost.

28. Also see Matthew S. Goldberg, *A Survey of Enlisted Retention: Models and Findings*, CRM D0004085 (Alexandria, Va.: Center For Naval Analyses, November 2001) for a discussion of such models.

Figure 6.

The Cost of Enlisted Personnel to DoD Compared with the Cost of Civilian Workers to Private Employers

(Thousands of 2003 Dollars)



Source: Congressional Budget Office based on data from the Department of Defense, the Department of Labor's Bureau of Labor Statistics, and the Kaiser Family Foundation.

Note: The employment cost for an enlisted service member includes regular military compensation (assuming someone at the median pay grade for each year of experience), the cost of medical benefits while the member is on active duty, and the accrual cost of retirement pay and medical benefits (including medical benefits that retired service members receive while under and over 65 years of age). The employment cost of a civilian worker includes the employer's contributions to a retirement plan and medical insurance. The civilian costs shown here are for workers earning at the 70th percentile for each level of education (in other words, their earnings exceed those of seven out of 10 workers with the same level of education and years of experience).

Box 4.**The Annualized-Cost-of-Leaving Approach to Comparing Military and Civilian Pay**

Comparisons of military and civilian earnings are complicated by the fact that so much of military compensation takes the form of future retirement benefits. Since the 1970s, military manpower analysts have used so-called annualized-cost-of-leaving (ACOL) models to address that problem.¹

ACOL models calculate the present discounted value (PDV) of a service member's earnings over his or her lifetime for all possible future lengths of service, minus the PDV of the lifetime earnings that the member forgoes by not leaving the military immediately and taking civilian employment. That calculation yields a net PDV for serving one additional year and then leaving instead of leaving immediately, another net PDV for serving two additional years and then leaving instead of leaving immediately, and so on. Each of those net PDVs is then spread out—annualized—over the number of years of military service associated with it, which converts it into a constant stream of military pay.

The annual amount of each stream is, in effect, the annualized pay differential between military and civilian employment for the associated service horizon.

1. See John H. Enns, Gary R. Nelson, and John Warner, "Retention and Retirement: The Case of the U.S. Military," *Policy Sciences*, vol. 17 (1984).

A service member seeking to maximize his or her well-being will remain in the military as long as there is any future length of service that offers an annualized pay differential greater than his or her annual distaste for military service. Otherwise, the member will leave immediately. In such models, retention decisions for an individual at, say, 12 years of service are driven not by whether the difference between military and civilian pay in that year outweighs the individual's distaste for military service but by whether the maximum of the annualized pay differentials looking over all possible lengths of future service (the ACOL value) exceeds the member's distaste for military service.

Because both military and civilian retirement benefits enter into the PDV of lifetime earnings, this approach offers a way to compare military and civilian wages that takes retirement benefits into account. The annualized pay advantage of military over civilian employment—and thus the ACOL value—rises rapidly for people approaching 20 years of service because the value of military retirement is annualized only over the years left to serve to earn it (see Figure 7). After 20 years of service, however, the retirement pay a member forgoes by remaining on active duty makes future military service look financially unattractive relative to civilian employment, and the annualized military pay advantage (the ACOL value)

only on differences in annual salaries—an indication that they better characterize the financial comparisons that service members make.

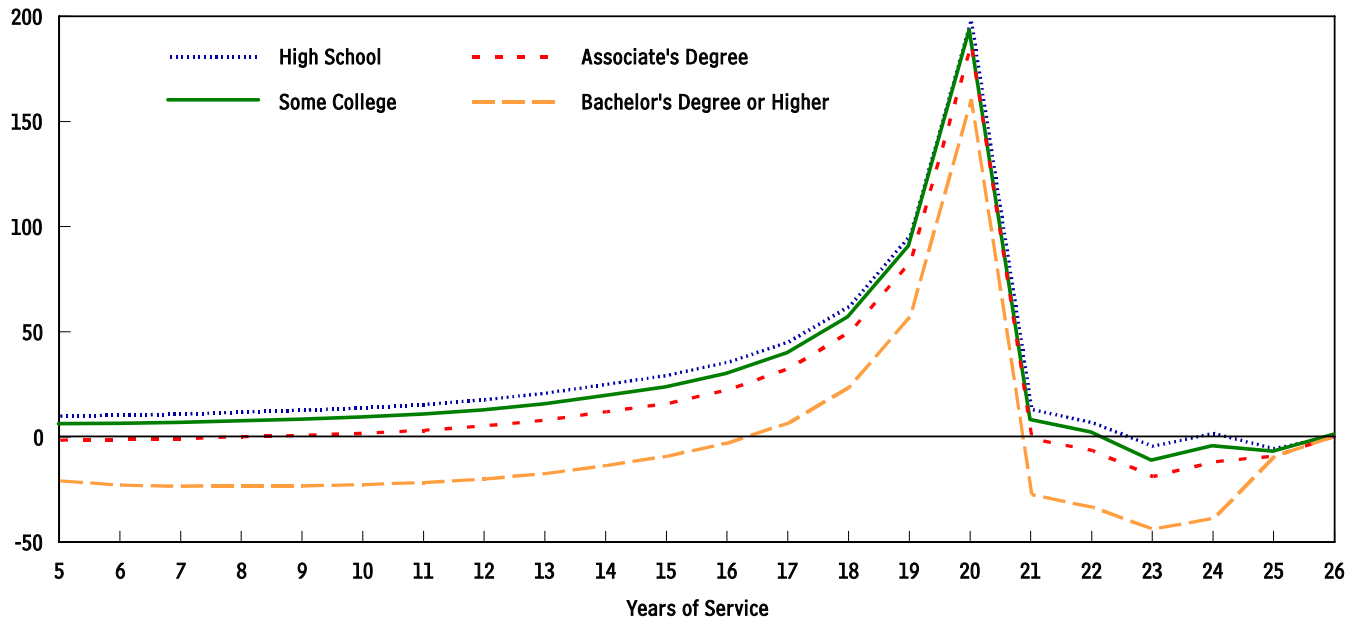
Viewed from that career perspective, the financial benefit of continued military service rises (or the financial disadvantage declines) as the number of years of service approaches 20 (see Figure 7). During an enlistee's first term of service, differences in annual civilian and military salaries are very important, and retirement benefits—which have a low present discounted value and would require

many years of service to earn—are much less important. By the ninth year of service, however, the present discounted value of retirement benefits, annualized over the (now fewer) years of service required to earn them, makes military service appear financially attractive even to people who, in the civilian sector, could earn at the 70th percentile of civilians with associate's degrees. By the 17th year of service, even an individual with a bachelor's degree who could earn at the 70th percentile in the civilian sector for that level of education would find continued military service financially attractive.

Figure 7.

Annualized Pay Advantage of Military Service Over Civilian Employment for Enlisted Personnel, by Highest Level of Education Attained and Years of Service

(Thousands of 2003 Dollars)



Source: Congressional Budget Office.

Note: The annualized pay advantage is the present discounted value of the lifetime earnings advantage of continued military service over civilian employment expressed in terms of an annual salary differential. The pay advantage for each education level and year of service is calculated using pay for an enlisted member at the median grade for each year of service compared with pay for a civilian worker earning at the 70th percentile of civilian workers.

Two factors explain why DoD can maintain high retention among midcareer personnel even though (as noted in the Ninth Quadrennial Review of Military Compensation) their salary profile by years of experience looks relatively flat compared with that of civilian workers who have similar education. One is that people with a strong preference for military service are those most likely to still be in the military at the midcareer point. The other is that the current retirement system ensures that the financial incentive to stay increases with years of service, regardless of education.

The Uncertain Policy Implications of Rising Educational Attainment for Enlisted Compensation

DoD officials view the increasing education level of the enlisted force (and of young people as a whole) as a cause for concern about the adequacy of compensation for midcareer enlisted personnel, prompting them to target

pay raises to those personnel. They also argue that pay raises targeted to midcareer and senior enlisted personnel will increase retention among those junior enlisted members who may consider remaining in the military. However, the analysis in this paper suggests that concern about the adequacy of compensation may be misplaced. There is no evidence that DoD is failing to meet its quality objectives; indeed, in the view of many senior military leaders, the quality of the current enlisted force is unsurpassed. Overall, retention in the enlisted force remains at or above historical levels (see Figure 8). In addition, the fact that the share of the force with higher education is continuing to rise at each year of service and pay grade does not suggest a decline in the competitiveness of military compensation.

An alternative interpretation of current trends is that rising in-kind and cash benefits for service members have made a military career financially attractive not only to people with high school degrees but also to many individuals with some college education. If that interpretation is

correct, raising the benchmark for RMC to the salary paid to the 70th percentile of civilian wage earners with some college education could produce further increases in the average educational attainment of the enlisted force—and, potentially, demand for a still higher benchmark. Other ways of enhancing the quality of the enlisted force, by focusing on the best-performing personnel, might be more cost-effective.

Could Educational Trends and Quality Be an Issue in the Future?

Little, if any, evidence exists of quality problems in the current enlisted force that could justify targeting pay raises to midlevel and senior enlisted personnel. Nonetheless, DoD could face such problems in the future if repeated and prolonged deployments increased the hardships of a military career and if the returns from education in the civilian sector kept growing. With an all-volunteer force, DoD's continued ability to recruit and retain high-quality personnel depends largely on the changing civilian economy and cannot be taken for granted.

Military transformation could also increase the value of a more highly educated enlisted force to DoD. Just as a four-year college degree has come to be required for offic-

ers, the formal-education requirements for enlisted personnel could rise in the future if new technologies and operational doctrines increased the autonomous capabilities and responsibilities of individual soldiers. In a transformed force, DoD might need to consider policies that would further raise the quality and—at least incidentally—the formal-education qualifications of enlisted personnel.

Alternative Policies to Enhance the Quality of the Enlisted Force in the Future

If the quality of the enlisted force does become a concern in the future, further targeted pay raises for all midcareer and senior enlisted personnel could prove less cost-effective than policies that focused specifically on the best-performing personnel. Examples of such policies include speeding up promotion for the best performers, increasing the rewards for promotion as opposed to longevity, and providing alternative career tracks for people who obtain postsecondary education early in their military career.

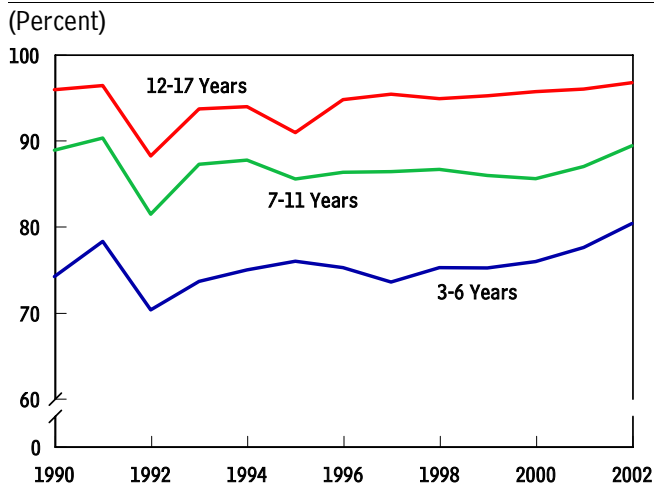
Continue Targeted Pay Raises for Midcareer Personnel.

A higher salary benchmark that targets raises to midcareer personnel may increase the quality of the force by boosting retention rates and allowing the services to be more selective in whom they keep. Nonetheless, targeting raises to all midcareer and senior enlisted personnel is likely to be an expensive approach to improving the quality of the force, for several reasons.

First, the effect of pay on retention declines with years of service.²⁹ That occurs partly because of selection—since personnel who remain have a greater preference for military service and are less responsive to changes in military pay relative to civilian pay—and partly because as years of service increase, the pull of the retirement system becomes greater, reducing responsiveness to current pay (see Figure 7).

Figure 8.

Continuation Rates for Active-Duty Enlisted Personnel, by Years of Service



Source: Congressional Budget Office.

Note: The retention rate for 2002 is most likely buoyed by the stop-loss orders (the temporary stoppage of exits from active duty) invoked for the war on terrorism.

29. For example, for service members in the mechanical maintenance occupational group, a 10 percent increase in pay is associated with an 18 percent increase in retention in the first term of service but with only an 11 percent rise in retention in the second term; see D. Alton Smith, Stephen D. Sylwester, and Christine M. Villa, "Army Recruitment Models," in Curtis L. Gilroy, David K. Horne, and D. Alton Smith, eds., *Military Compensation and Personnel Retention: Models and Evidence* (U.S. Army Research Institute for the Behavioral and Social Sciences, 1991).

Second, even if higher salary benchmarks increase retention, they may not enhance the quality of the force. Under the current retirement system (in which members are not vested in retirement benefits before 20 years of service), the military is reluctant to involuntarily separate midcareer personnel. As a result, any increase in retention among those service members because of targeted pay raises may lead to a force that is generally more senior but not necessarily of higher quality. And if overall higher retention slows promotions, it may have a negative effect on quality.

Third, targeted pay raises have important implications for military retirement costs. To avoid inversions in the pay scale, raises for midcareer personnel (grades E-5 through E-7) are typically accompanied by raises for more-senior personnel (grades E-8 and E-9). Because relatively few people are in grades E-8 and E-9, DoD argues that their pay raises are inexpensive. However, those raises increase the base on which retirement pay is calculated. Although DoD would not feel the higher retirement costs immediately, over the long run, a 10 percent targeted increase in pay for senior enlisted personnel could raise DoD's accrual charges by about 10 percent (or about \$660 million annually). In addition, much of the cost of higher retirement pay for people currently in the force would be paid by the Treasury rather than by DoD. Data from DoD's Office of the Actuary suggest that the targeted pay raises for enlisted personnel given from 2000 to 2002 added about \$5 billion to the unfunded liability of the retirement system. (The addition resulting from the 2003 and 2004 raises has not yet been determined.)

Some supporters of targeted raises counter that even if making the salaries of midcareer military personnel comparable to those of civilians with some postsecondary education is not a cost-effective way to improve the quality of the force, it is desirable as a matter of fairness. Because only about 20 percent of the recruits in each entering cohort complete a full career and become eligible for retirement benefits, a benchmark based on current salaries may be more equitable than one that takes retirement into account. Excluding retirement benefits, the compensation of midcareer enlisted personnel is less than the 70th percentile of earnings for civilians with some college education. Given the high quality of the enlisted force, some people—including service members—might consider that level unfairly low. If that argument is valid, however, the most cost-effective solution may be to make the retirement system more equitable (for example, by allowing

earlier vesting) rather than to try to produce parity between military and civilian salaries without regard to retirement benefits.

Expand the Role of Promotion. The military rewards superior performance and quality in the enlisted force through promotion and through the pay, status, and opportunities that accompany higher rank. DoD could expand the rewards for performance within the current system by increasing the weight that the pay table gives to promotions (as opposed to total length of service) or by increasing the relative speed at which the best personnel are promoted.

Two examples of those approaches are described below. Both would maintain the current system's emphasis on performance and quality rather than on education per se. As a result, they would raise the financial rewards for education only to the extent that education is correlated with quality and performance in enlisted jobs.

Increase Variability in Promotion Speed and Career Paths. Varying the speed of promotion is one way to reward performance and encourage the most qualified people to remain in the military. In the private sector, the difference in pay between high school graduates and people with some college education is growing. If, in the future, DoD wants to make a full enlisted career more attractive to high-quality personnel who obtain higher education early in their career, it may have to either raise pay for the enlisted force as a whole to unprecedented levels or provide a much faster promotion track for part of that force.

Creating a more rapid promotion track could entail making two changes. First, increasing the percentage of the force in grades E-8 and E-9 would mean that people who reached E-7 early in their career would still see opportunities for promotion and have an incentive to continue to excel. Second, adding an E-10 pay grade would ensure that members who were promoted early to E-9 still had an incentive for performance.

That approach could have several drawbacks, however. Increasing the range of years of service at each pay grade could conflict with the culture of the active-duty services, in which promotions are closely tied to years of service. In addition, an increase in the supply of more-educated personnel does not necessarily mean that the military's need for such personnel also increases. Moreover, if differences in the civilian earnings potential of personnel with and without postsecondary education continued to rise, it

could become increasingly difficult to fit the two groups within a single enlisted pay table and rank structure.

Reward Promotion as Opposed to Longevity. Besides raising the benchmark for enlisted personnel, DoD has modified the pay table for midcareer and senior personnel to increase the returns from promotion relative to those from longevity. For example, in the 1998 pay table, increases in longevity accounted for 32 percent of the growth in pay for a typical enlisted member between the 10th and 20th years of service, whereas promotions (to E-6 and then E-7) accounted for 68 percent. In 2003, by comparison, promotions accounted for 77 percent of the growth in pay over those years of service. DoD hopes that change will improve performance as service members compete more vigorously for promotion.

Another way to reduce the importance of longevity and reward the best performers would be to shift from the current system, in which pay depends on grade and total years of service, to one in which pay depended on grade and years of service within that grade. The present system pays the most to personnel who, for their rank, have the greatest total years of service—that is, those who were promoted the most slowly over their career. In contrast, a system based on time in grade would, in principle, pay the most to people with a given rank and years of total service who achieved that rank the most quickly. Seniority would still be rewarded with higher pay, but it would be defined in terms of years in pay grade rather than total years of service.

The benefits of a pay table based on time in grade, however, depend on variation in the speed of promotion. In a system in which everyone tended to be promoted to each rank at about the same point in their career, there might be little difference between a table based on years of service and one based on time in grade. Another difficulty is that if a table based on time in grade is to increase the pay of service members who are promoted rapidly, it must ei-

ther provide offsetting reductions in pay for other personnel or increase total military compensation.³⁰

Provide Alternative Career Paths for Personnel Who Obtain Higher Education Early in Their Career. Another option to reward education and offer better military careers would be to allow more enlisted personnel to move into the ranks of either warrant officers or commissioned officers. If the returns from education in the private sector continue to rise, it may become increasingly difficult to make the standard enlisted career track attractive to people with education without at the same time paying high wages (relative to similarly educated civilians) to people without those qualifications. As long as the enlisted force has enough personnel with college degrees in leadership positions that may require them, it may not be cost-effective to have high-quality personnel with degrees in occupations that do not require them.

In the civilian sector, workers move on to other positions as they acquire higher education. In the military, the lack of lateral entry into the officer corps—where there are jobs that require higher education—makes that pattern difficult to emulate. Although all of the services have programs to commission enlisted personnel as officers, they are attractive only to relatively young service members because they start at the junior-officer level. Expanding the flow of enlisted personnel to the warrant-officer and commissioned-officer levels might provide a way to accommodate increasing levels of education.

30. One way around that problem might be to introduce the new pay table gradually, taking advantage of the fact that military pay, like civilian wages, grows faster than the rate of inflation. Service members could stay under the current pay table, adjusted each year for inflation, until they chose to switch to a table based on time in grade. Pay raises greater than inflation would be used to gradually make the time-in-grade table attractive to a larger percentage of the force.

Details of CBO's Analysis of Retention

The Defense Manpower Data Center (DMDC) created a data set for the Congressional Budget Office's (CBO's) retention analysis by merging information from three sources:

- Records from the 1999 Survey of Active Duty Personnel, which provides more up-to-date information about education than administrative records do.¹
- Selected data from the Active Duty Personnel Master Edit File for September 1999 through June 2002, covering service members' rank, age, years of service, military department, race, sex, and other details.
- Information from the Active Duty Personnel Transaction File for May 1999 through June 2002, showing members' exits from military service (losses).

A sample of about 15,000 enlisted personnel (excluding Coast Guard members) was extracted from the data set and formed the basis of this analysis. In the sample, about 37 percent of personnel were in the Army, 24 percent in the Navy, 25 percent in the Air Force, and 14 percent in the Marine Corps (see Table A-1). About 83 percent were male and 62 percent were white. The average age of respondents at the time of the survey was 30, and the average length of service was nearly 10 years. CBO applied weights developed by DMDC to "correct" the survey responses to reflect the enlisted population as a whole, ad-

1. The survey covered all active-duty Army, Navy, Air Force, Marine Corps, and Coast Guard members (including reservists on active duty) below the rank of general or admiral who had had at least six months of active-duty service at the time the surveys were mailed. For additional details about the survey, see Defense Manpower Data Center, *1999 Survey of Active Duty Personnel: Administration, Datasets, and Codebook*, Report No. 2000-005 (December 2000), *Overview of the 1999 Survey of Active Duty Personnel*, Report No. 2000-008 (February 2001), and *1999 Survey of Active Duty Personnel: Statistical Methodology Report*, Report No. 2000-010 (September 2000).

Table A-1.

Selected Characteristics of the Sample

Variable	Sample Average
Service Affiliation (Percent)	
Army	37
Navy	24
Air Force	25
Marine Corps	14
Demographic Characteristics (Percent)	
Male	83
White	62
Black	18
Hispanic	11
Other race	7
Multiracial	3
Average age at survey date (Years)	30
Career Information	
Average years of service at survey date	9.6
Average rank at survey date	E-5
Occupation (Percent)	
Electrical	20
Functional support	17
Infantry	14
Communications	10
Electronic	10
Supply	8
Health	7
Craft	3
Other technical	3
Nonoccupational	1
Other	7

Source: Congressional Budget Office.

justing for differences in sampling and response rates. The percentages and other averages shown in Table A-1 and throughout this paper reflect those weighted responses.

The statistical analysis, centering on the relationship between education and retention, was conducted for enlisted personnel who were nearing a reenlistment decision point. Those personnel were tracked for about 24 months after their decision point to determine whether they had remained in the military. CBO used logit equations to analyze the relationship between various factors and that retention behavior. Specifically, the analysis sought to determine, holding other things constant, whether enlisted members with postsecondary education are more or less likely to leave the military than otherwise similar members with only a high school education. The analysis controlled for the effects of a wide range of personal characteristics and job-related factors. In addition, it was designed to determine whether, for service members who had attained a given level of postsecondary education, acquiring that education while on active duty instead of before entering military service made any difference for retention. Thus, the following factors were variables in the equations:

■ Personal characteristics

- whether married
- whether married with children
- whether male
- whether white
- age

■ Job-related variables

- service (Army or Air Force)²
- years of service (measured at survey date)
- whether in a technical occupation with civilian equivalents (such as electronics)
- whether in a nontechnical occupation with civilian equivalents (such as supply)
- whether in an exceptionally high rank or an average rank, given years of service (an indicator of either relatively fast or average speed of promotion, compared with below-average promotion pace)

■ Education variables at time of survey

- high school
- some college (one or more semesters but no degree), and whether it was acquired while in the service
- associate's degree, and whether it was acquired while in the service
- bachelor's degree or higher, and whether it was acquired while in the service

With the exception of age and years of service, those variables are “categorical,” with a value of 1 if true and 0 otherwise. The dependent variable—whether the enlisted member stays in the military—also takes on a value of 1 if true and 0 otherwise. The coefficients and significance level of each of the variables in the estimated logit equations are shown in Table A-2. A negative sign on a coefficient indicates an effect that decreases the probability of retention, and a positive sign indicates the opposite effect. The actual changes in the probability of staying in the military (as presented in Table 1 on page 10) are calculated from those coefficients.

2. The Department of the Navy was the omitted service variable in the equation.

Table A-2.

Results of Estimated Logit Equations for Retention of Enlisted Personnel

	3-6 Years of Service		7-11 Years of Service		12-17 Years of Service	
	Coefficient	Significance Level	Coefficient	Significance Level	Coefficient	Significance Level
Mean of Dependent Variable	0.45		0.73		0.93	
Intercept	-2.315	0.003 ^c	-2.561	0.038 ^b	-3.534	0.152
Married	0.003	0.990	0.235	0.510	-1.206	0.091 ^a
Married with Children	0.510	0.014 ^b	-0.212	0.510	0.446	0.382
Male	0.021	0.908	0.302	0.346	0.103	0.864
White	-0.722	0.0001 ^c	-0.538	0.030 ^b	-0.656	0.123
Age	0.040	0.172	0.084	0.060 ^a	0.001	0.984
Army	-0.089	0.616	-0.415	0.110	0.068	0.888
Air Force	0.882	0.0001 ^c	1.018	0.004 ^c	1.274	0.089 ^a
Years of Service at Survey Date	0.290	0.0005 ^c	0.167	0.088 ^a	0.462	0.001 ^c
Technical Occupation						
with Civilian Equivalent	-0.043	0.810	-0.252	0.374	0.497	0.231
Nontechnical Occupation						
with Civilian Equivalent	0.266	0.186	0.646	0.064 ^a	0.778	0.189
Fast Mover	0.340	0.474	0.394	0.481	0.246	0.803
Regular Mover	0.078	0.839	-0.006	0.988	-0.236	0.689
Some College	0.037	0.845	-0.569	0.096 ^a	0.116	0.840
Associate's Degree	0.571	0.158	-0.647	0.316	-0.617	0.606
Bachelor's Degree or Higher	-0.578	0.252	-0.562	0.399	10.927	0.962
Whether "Some College"						
Is Acquired While in the Service	0.268	0.195	0.418	0.182	0.412	0.445
Whether Associate's Degree Is Acquired While in the Service	-1.179	0.036 ^b	-0.483	0.481	1.085	0.386
Whether Bachelor's Degree or Higher Is Acquired While in the Service	0.458	0.581	-1.537	0.081 ^a	-11.382	0.960

Source: Congressional Budget Office.

Notes: The dependent variable is whether the service member stayed in the military. High school education is the omitted education variable in the equations. The probabilities reported in Table 1 on page 10 are based on the coefficients in this table.

The significance level is the probability that the coefficient is 0. A low significance level (0.05 or lower, for example) indicates that it is unlikely that the coefficient is 0 and that the variable more than likely has an effect on retention.

- a. Statistically significant at the 90 percent level.
- b. Statistically significant at the 95 percent level.
- c. Statistically significant at the 99 percent level.

