The Effect of High Performing Mentors on Junior Officer Promotion in the United States Army

David S. Lyle and John Z. Smith

Military assignment mechanisms provide a unique opportunity to estimate the impact of high performing mentors on job advancement of their subordinates. Combining U.S. Army administrative data with officer evaluation reports, we find that high performing mentors positively affect early junior officer promotion, and that early promotion probabilities rise as the duration of the high quality mentorship increases. These effects are largest for high ability protégés. Junior officers who were exposed to multiple high performing mentors did not experience an additional increase in promotion rates.

Version: 21 September 2013

* We thank Whitney Dudley for her expert data support as the research assistant on this project. We also thank Dr. Dean Dudley and seminar participants at the Western Economic Association, the Office of Economic and Manpower analysis, and the U.S. Military Academy for their valuable comments and suggestions. The views expressed herein are those of the authors and do not purport to reflect the position of the U.S. Military Academy, the Department of the Army, or the Department of Defense.

I. Introduction

As of 1941, having spent 26 relatively unspectacular years as an Army officer, Dwight David Eisenhower had achieved only the modest rank of Lieutenant Colonel. Although Army promotion boards had not yet recognized his potential for strategic leadership, one of his superior officers did. Immediately after the attack on Pearl Harbor in 1941, General George C. Marshall, Chief of Staff of the Army, appointed Eisenhower as a Deputy Chief in the War Plans Division. By July of 1942, the Army promoted him to the rank of Lieutenant General and placed him in charge of U.S. Army operations in Europe. Only 19 months later, in February of 1944, General Eisenhower assumed the role of Supreme Allied Commander. He led operations that brought victory in Europe and would go on to serve as President of the United States. Most credit Ike's rapid rise from relative obscurity to the role that mentors, such as General Marshall, played in his life.

Examples of important mentoring relationships are neither exclusive to the military nor are they recent developments. As a young telegraph operator with the Pennsylvania Railroad, Andrew Carnegie benefited from the mentoring of Thomas A. Scott (Zaleznik 1977). In 1901, J.C. Penney developed a system in which each store manager selected and trained a protégé who could then be sent out to open another store (Roche 1979). Rockoff (2008) reports that the majority of states now require mentorships for newly hired teachers, and the number of public school teachers who reported receiving guidance from a mentor increased from 25 percent in 1990 to 70 percent in 2004. According to the Institute for Corporate Productivity, more than half of all businesses with greater than 5,000 employees and nearly 70 percent of Fortune 500 companies offer formalized mentoring programs (Gutner 2009). Most mentoring programs are designed to shape employee development, screen for performance, leverage networks, inspire employees, and instill organizational norms. Each of these can have substantial impacts on

internal promotion, which is the focus of our study. Regardless of an employer's reason for having a mentoring program, the above evidence suggests that a large and growing number of organizations believe that mentoring is a valuable investment in their employees.

Yet despite the prevalence of mentor programs, there is little empirical evidence that substantiates the return from mentor investments. There are several reasons why evidence is hard to come by. First, a simple comparison between individuals with and those without mentors is problematic because a poor mentor is as likely to steer a protégé in the wrong direction as a good mentor is to promote positive outcomes. Second, there are numerous pathways through which mentoring relationships can work, each of which can confound the effects from another. Third, individuals who belong to the same social group tend to behave similarly. Manski (1993), in his foundational paper on identifying social effects, details three hypotheses that potentially explain this observation: endogenous, exogenous, and correlated effects.[1] Differentiating between these potential explanations requires a unique research design.

The peer effects literature has made solid progress in addressing many of the issues surrounding the identification of social effects (Sacerdote 2001; Duflo and Saez 2002; Zimmerman 2003; Bandiera, Barankay, and Rasul 2005; Lyle 2007; Carrell, Fullerton, and West 2009; Duflo, Dupas, and Kremer 2009; Guryan, Kroft, and Notowidigdo 2009; Jackson and Bruegmann 2009; Mas and Moretti 2009). Most credible studies attempt to locate exogenous variation in the assignment of peer relationships as a first step towards interpreting estimates that are free from the impact of correlated effects. In addition to locating exogenous social group assignment mechanisms, other studies estimate social effects using only pretreatment measures

[1] Manski (1993) defines each as follows: endogenous effects, wherein the propensity of an individual to behave in some way varies with the behavior of the group; exogenous effects, wherein the propensity of an individual to behave in some way varies with the exogenous characteristics of the group; and, correlated effects, wherein individuals in the same group tend to behave similarly because they have similar individual characteristics or face similar institutional environments.

in an effort to further mitigate the impact of other correlated effects such as common shocks. Using only pretreatment measures is also one way of differentiating between endogenous and exogenous social effects. There is also a part of the social effect literature that moves beyond linear in means estimation techniques to consider other moments of a social group distribution (Benabou 1996; Hoxby and Weingarth 2006; Lyle 2009). Although we use the same basic Manski framework as the peer effects literature, mentor relationships avoid common shock correlations and differentiate exogenous from endogenous social effect interpretations by virtue of their construct: Mentors and protégés do not share the same outcome at a single point in time.

Like much of the peer effects literature, our study exploits a plausible source of exogenous variation using the assignment of junior officers to their senior officer mentors within the U.S. Army. This prevents us from confounding the interpretation of our estimates with other correlated effects that arise when individuals share similar characteristics. Unlike in peer relationships, however, protégés and their corresponding mentors do not share the same outcomes at a single point in time. This allows us to further mitigate common shock correlations that affect all members of the social group simultaneously. The fact that protégés and mentors cannot simultaneously affect each other in terms of our outcome of interest implies that we are able to interpret our estimate as an exogenous social effect. Our research design is also unique in that it affords the opportunity to compare high performing mentors with lower performing mentors in a setting where all protégés have a mentor assigned by the Army.[2] This identification strategy provides a clean, reduced form interpretation of the effect that a high performing mentor has on junior officer promotion. Although we are unable to identify the exact

[2] Throughout our study, we define high performing mentors as mentors who were previously promoted early to the rank of Major. This early promotion decision is a signal of high performance potential within the Army officer corps and is granted several years prior to the senior officer mentors in our sample interacting with their junior officer protégés.

pathways through which mentor effects work, this study sheds light on both the net effect of mentoring and provides suggestive evidence on several potential pathways through which mentor effects may operate.

Mentor relationships in our study are between battalion commanders (mentors) and their subordinate company commanders (protégés). Prior to the formation of the mentor-protégé relationships that we study, the Army designates a share of the mentors as high performers. We study how the treatment effect of serving under a high performing mentor impacts the probability that a protégé is subsequently promoted early. Therefore, our key identification assumption is that the assignment of a protégé to a high performing mentor is uncorrelated with other potential determinants of a protégé's early promotion. Both descriptive statistics and regression results support our identifying assumption.

We find that junior officers who serve under a high performing mentor are 29 percent more likely to be selected for early promotion to the rank of Major. The likelihood of early promotion increases in the duration of the high quality mentorship, and the impact of time spent with a high performing mentor is also greater for higher ability protégés. Finally, junior officers who were exposed to multiple high performing mentors did not experience an additional increase in promotion rates. These findings are robust to several alternative specifications.

II. Military Mentor Assignments and Background

Similar to mentor-protégé relationships in firms, the mentorships we study in the Army feature both career-oriented mentoring behavior (human capital development) and psychosocial behavior (role modeling, instilling self-confidence, and counseling). The specific mentor relationship of interest for this paper is the one that forms between Captains serving as company

commanders and their primary mentor, their battalion commander (see Figure 1).[3] Battalion commanders hold the rank of Lieutenant Colonel, and are responsible for mentoring all junior officers within their battalions. Within days of joining a unit, battalion commanders conduct initial counseling with their company commanders. They have daily interaction, and provide constant feedback over the full range of company commander job requirements. Quarterly counseling and an annual evaluation report formalize the mentor-protégé relationship. Most battalion commanders are typically mentoring four company commanders at any given time.

Company commanders are responsible for the training, readiness and welfare of more than 100 subordinates, and are charged with successfully completing missions that are central to national security. Given the vital role that company commanders play in the success of a battalion, battalion commanders invest heavily in mentoring these junior officers. And more than any other assignment, the mentoring and corresponding evaluations that company commanders receive will significantly impact their promotion potential throughout their military careers. Company command is the most formative assignment for junior officers before the Army considers them for promotion to the rank of Major. Officers who the Army selects for early promotion to Major are significantly more likely to receive subsequent early promotions and future command positions.[4]

Our contention that the military mentor relationships we study are formed exogenously is supported by Army assignment policies. Junior officers receive their battalion commander mentor through a sequence of independent, third-party decisions. Military mentor relationships occur much like most other things related to the military – the Army assigns them. Ideally,

[3] The rank structure of the U.S. Army officer corps, from accession to brigade command, is as follows: Second Lieutenant, First Lieutenant, Captain, Major, Lieutenant Colonel and Colonel.

[4] For all Army officers commissioned in the year groups contained in our sample, early promotion to Major increased the likelihood of subsequent early promotion to Lieutenant Colonel by a factor of nearly 8, and subsequent selection to battalion command by a factor of 3.5.

military personnel assignments would be based on a well-conceived plan. But in reality, the large bureaucratic structure of the U.S. Army and the changing nature of world events that drive military requirements suggest otherwise. Other than listing installation preferences and special family considerations, junior officers have little influence over their next assignment. The Army's Human Resources Command assigns these officers to an installation, the installation assigns them to a division, the division assigns them to a brigade, and the brigade assigns them to a battalion (Figure 1). Per Army doctrine, the basis of each subordinate assignment is the "needs of the Army." Within a given rank and occupational branch, the Army treats officers as generic for assignment purposes; talents and experiences of officers do not factor into assignments.

Likewise, "the needs of the Army" determine which Lieutenant Colonels command each of the hundreds of battalions across the Army. Of importance to this study, our designation of a battalion commander as a high performing mentor is determined prior to the assignment of the Lieutenant Colonel to a battalion. Additionally, battalion commander assignments do not regard information on current or future junior officers who are serving or will serve in the battalion under that battalion commander.

The above description of how the Army assigns Captains and Lieutenant Colonels to battalions suggests that the resulting pairing of protégés with mentors is likely uncorrelated with other potential determinants of junior officer promotion. Before we explain our data and provide evidence for exogenous assignment, however, it is important to describe how the Army manages officer promotion.

The Army manages officer promotion by the year in which each officer receives a commission. All officers commissioned in the same year belong to the same cohort. Promotion from Captain to Major is the first effective "up or out" decision officers face, occurring at an

officer's 9th year of service. The Army promotes about 85 percent of Majors on time, which is considered a promotion in the "primary zone." Officers who are not selected are considered again the following year in what is considered late promotion or "above the zone." The Army promotes approximately 7 percent of a cohort late. Those Captains who are passed over for promotion twice are separated from active-duty service. Each year, the Army also considers Captains with exceptional performance records for early promotion to Major.[5] These "below the zone" promotions constitute roughly 8 percent of a cohort, and are limited by policy to no more than 10 percent of that cohort.[6]

Major promotion boards are made up of 18-20 senior officers.[7] Promotion boards review each officer's administrative file and annual officer evaluation reports (OERs), which provide detailed information on officer performance and potential. Battalion commanders provide a majority of the input for company commander evaluation reports, but the only rater (mentor) information visible to the promotion board is the rater's name. They grade an officer's performance as well as inform brigade commanders, who provide an enumerated box check for each company commander as part of the evaluation. Brigade commanders assign one of three ratings, Above Center of Mass (ACOM); Center of Mass (COM); or Below Center of Mass (BCOM). Brigade commanders must maintain a rating profile where at any point in time less than 50 percent of officers can receive an Above Center of Mass (ACOM) rating.

In addition to using early (below the zone) promotion to the rank of Major as a measure of mentor quality, we also use it as our outcome variable for the Captains in company command

[5] Early promotions are typically only 1 year earlier than on time promotions. In rare instances, highly qualified Majors may be promoted two years early, in what are referred to as "double below the zone" promotions.
[6] The Secretary of the Army can issue exception to policy letters raising the limit on the proportion of a cohort promoted below the zone from 10 to 15 percent. The proportion of our company commander sample subsequently promoted below the zone to Major is somewhat higher (9.2 percent) than the average across all occupational branches, as officers in the combat arms branches have slightly greater probabilities of early promotion.
[7] Lieutenant Colonels currently serving as battalion commanders typically do not sit on Major promotion boards.

positions. More specifically, we look at the probability that the Army promotes a Captain early to the rank of Major based on whether the officer served his company command under a battalion commander who the Army also selected for early promotion to the rank of Major.[8]

III. Military Data

Our study uses Army administrative data on officers from 1974 through 2010. The mentors in our sample are Lieutenant Colonels who served as battalion commanders at any time between 1998 and 2008. Battalion commander mentors are linked to their junior officer protégés through the use of officer evaluation reports that are available from 1998 to 2008. All of the officer data are from the Army's Office of Economic and Manpower Analysis, West Point, NY. Lieutenant Colonels commanding battalions hold that position for roughly 24 months. Captains commanding companies in our sample hold that position for approximately 19 months. Battalion and company commanders do not take command as a team, but rotate in and out of these command assignments individually. As a result, battalion commanders may have eight or more company commanders serve under them during their command tenure, and company commanders often serve under more than one battalion commander.

Table 1 contains summary statistics for these battalion commanders.[9] Column 1 provides summary statistics for all Lieutenant Colonels who held that rank between 1998 and 2008, and represents the pool from which the Army selects battalion commanders.[10] Column 2 contains summary statistics for battalion commanders who served as mentors for our sample of company commanders, and is a subset of column 1.[11] A battalion commander mentor is classified as high

[8] Battalion commanders were selected early to the rank of Major some 8 years prior to serving as a battalion commander.
[9] See Appendix 1 for a complete description of variables and sample qualification rules.
[10] The proportion of battalion commanders who are high performing exceeds the proportion of all Lieutenant Colonels previously promoted early to Major due to the competitive nature of selection to battalion command.
[11] The stock of Lieutenant Colonels in the Army at any time exceeds the number serving as battalion commanders.

performing if he was promoted early to the rank of Major. College rank indicators reported in Table 1 measure the admissions selectivity of the school from which the officer received his undergraduate degree.[12] Commissioning sources and program controls indicate whether an officer was commissioned from the United States Military Academy (USMA), from a Reserve Officer Training Corps (ROTC) program by scholarship type, or other source of commission such as Officer Candidate School (OCS). With the exception of the increase in the share of high quality mentors in column 2, which is what we would expect for Lieutenant Colonels selected for battalion command, the summary statistics for our battalion commander mentors are comparable to the pool of all Lieutenant Colonels from which they were drawn.

Column 1 of Table 2 reports summary statistics for male officers in one of the combat arms occupational branches who were commissioned from either USMA or ROTC and who served as Captains between 1998 and 2008. All Captains in column 1 completed company command and remained on active duty until 10 years of service. Our selected sample of company commander protégés in column 2 is virtually identical to the larger pool of Captains (column 1) for all of our officer demographics.[13] The similarity between our company commander sample and the population of Captains reinforces our findings from Table 1; our protégés are virtually identical to the larger population of officers from which they are drawn.

For the protégés in our sample, our variable of interest is an indicator equal to one for company commanders who were ever rated by at least one high performing mentor (battalion commander).[14] Approximately 44 percent of company commanders (1,812 of 4,142) served

[12] College rank indicators are from Peterson's Undergraduate Databases, 1983-1984 through 1998-1999.
[13] Captains typically spend 5-6 years in that rank and company command lasts 18-20 months on average, so the stock of Captains in the Army at any time exceeds the number of Captains serving as company commanders. The difference in observations between columns 1 and 2 arises because not all Captains had complete information on time in company command and not all could be linked to their battalion commander mentors in our data. Sample qualifications rules are discussed in detail in Appendix 1.
[14] Some 43 percent of our company commanders were rated by more than one battalion commander.

under a high performing mentor.[15] We report summary statistics in Table 2 separately for all company commanders who ever had a high performing mentor (column 3), and company commanders who never had a high performing mentor (column 4). Company commanders who had a high performing mentor were 2.9 percentage points more likely to be promoted early as compared to company commanders who never served under a high performing mentor, and this difference in means is significant.[16] The lack of substantial differences across the demographic variables in Table 2 supports our assertion that the assignment of company commanders to battalion commander mentors is as good as "random" with regard to observable characteristics. Notice that there is less than a half month of difference in deployment lengths between officers who had high performing mentors and those who did not.

Demonstrating that Captains who served under a high performing mentor are similar across all observables to those who did not is an important first step in validating our identification assumption. To further explore the slight differences in company commander characteristics by mentor quality, we estimate a series of linear probability models in which we regress our variable of interest (ever having served under a high performing mentor) on all of the control variables. If company commander assignments are orthogonal to their observable characteristics, we would expect the controls to be uninformative in explaining whether or not a company commander ever served under a high performing mentor.[17]

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[15] There are three reasons for the difference between the cohort early promotion rate (9 percent) and the fact that 44 percent of our company commanders ***ever*** served under a high quality mentor: (i) officers promoted early to the rank of Major tend to have higher retention rates; (ii) officers promoted early to the rank of Major have higher selection rates to battalion command; (iii) battalion commands are filled by more than one officer cohort at a time.

[16] The impact of ever having a high performing mentor on early promotion to Major is not an artifact of time spent in company command: Average months in company command for Captains promoted early to Major is 20.02, compared to 19.62 months for Captains not promoted early. This difference is not statistically significant. In linear probability models predicting below the zone promotion to Major as a function of a full set of controls and months in company command, the point estimate on time spent in company command was roughly zero and not significant.

[17] This approach is motivated by Altonji, Elder, and Taber (2005), who are interested in identifying a causal effect of Catholic high school attendance on high school completion and subsequent college enrollment. The authors regress

We report the estimates from these control variable regressions in Table 3. Column 1 shows estimates for the full set of demographic controls. The specification in column 2 adds year of commissioning indicators, column 3 includes additional branch controls, and column 4 contains additional unit controls. Nearly all covariates are small in magnitude and none are statistically significant in the full (column 4) specification. The inclusion of the full set of demographic controls in column 1 explains only 1 percent of the total variation in the probability of ever having a high performing mentor. Including major structural controls such as the officer's commissioning year, combat arms branch and unit (columns 2 through 4) explains only an additional 7 percent of the variation in our variable of interest. The slight correlations between observable determinants of promotion and our mentor quality variable further support the main assumption for our identification strategy. As an additional robustness test, we investigate whether a Captain's officer evaluation report prior to taking company command predicts his assignment to a high performing mentor. As shown at the bottom of column 5, the estimate on the indicator variable for the Captain receiving an Above Center of Mass (ACOM) evaluation on his most recent evaluation prior to taking company command is small and insignificant.

IV. Empirical Framework

Our identification strategy turns on the assumption that the assignment of a military mentor is unrelated to other potential determinants of career advancement for Captains. In the context of Manski's framework, military assignment mechanisms mitigate against correlated effect interpretations. Using measures of mentor ability that were determined prior to the formation of the mentor-protégé relationship that we study insures against common shock interpretations, and allows us to differentiate exogenous from endogenous mentor effects.

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their variable of interest (Catholic high school attendance) on the full set of controls to demonstrate that the control variables collectively have only a modest impact on the likelihood a student attends Catholic high school.

Together, this suggests that the mentor relationships in our study provide a plausible source of variation to identify a reduced form, causal effect of mentor quality on protégé promotion. The summary statistics by mentor quality reported in Table 2 and the results of the linear probability model regressions of the mentor quality indicator on officer demographics in Table 3 further support this claim.

To investigate our hypothesis more formally, we estimate a linear probability model with the following structure:

$$Y_i = \alpha + \delta \cdot M_i + \beta \cdot X_i + \theta_{1992-1999} + \lambda_{Branch} + \eta_{Unit} + \varepsilon_i. \quad (1)$$

Here the left-hand side variable, Y_i, is a binary variable that equals 1 if a Captain is promoted to the rank of Major early (below the zone), and zero otherwise. The coefficient, δ, on the dichotomous variable of interest, M_i, represents the effect of having a high performing mentor who was selected for early promotion to the rank of Major. X_i denotes other covariates that account for race, marital status, SAT quartile, college ranking, source of commission and deployment duration. We include these variables because each is a potential determinant of early promotion.

We include controls for the year in which the Captains in our study entered the Army ($\theta_{1992-1999}$) to account for the way the Army uses centralized promotion boards to manage its officers by specific year group cohorts. Controls for commissioning cohort (year) absorb shocks common to an entire year group of officers.[18] We also include occupational branch controls (λ_{Branch}) to account for the Army's attempt to promote a fairly uniform share of officers from each branch. As one final check on the validity of our specification, we include controls for a

[18] Cohort controls at the Captain level also go a long way in accounting for cohort effects at the mentor level, since the Army also manages battalion commander assignments by year group.

company commander's unit of assignment down to the brigade level (η_{Unit}) to address any concerns that unit reputation effects may influence a junior officer's promotion potential.

Interpreting δ as the reduced form causal effect of having a high quality mentor requires M_i to be orthogonal to ε_i, which contains unobservable potential determinants of a Captain's likelihood of early promotion to the rank of Major. Although we are unable to directly test this assumption, Tables 2 and 3 provide supporting evidence of our claim that mentor assignments are unrelated to other potential determinants of promotion. Furthermore, the empirical specification in equation (1) above includes the full set of observable characteristics in X_i as controls. These variables entail all information the Army could use from its database to assign company commanders to specific mentors that are also potentially correlated with promotion likelihood. Therefore, after conditioning on the full set of our controls, we have a great deal of confidence in the interpretation of our estimates.

V. Empirical Results

Table 4 contains estimates of the model outlined in the previous section, which reports the impact of serving under a high performing mentor on a protégé's early promotion. In addition to the variable of interest, all specifications contain year group and occupational branch controls.

Column 1 shows that former company commanders who had a high performing mentor are 2.8 percentage points more likely to be promoted early to the rank of Major than former company commanders who did not have a high performing mentor.[19] We include other potential determinants of early promotion such as race, marital status, SAT, college ranking, commissioning source, and months deployed in columns 2 and 3. Despite the inclusion of these

[19] Company commanders frequently serve under more than one battalion commander, so we cluster all standard errors by unique groupings of battalion commanders. Mentor clusters are explained in Appendix 1.

additional variables, the point estimate on the mentor effect remains stable and significant. Column 4 includes unit-level controls to account for any unit reputation effects.[20] Once again, the estimate remains stable at 2.7 percentage points, which is nearly identical to the raw difference in early promotion rates of former company commanders across mentor quality shown in Table 2.[21] Given that each company commander who stays in the Army through his Major promotion board has only a 9.2 percent chance of being selected for early promotion to the rank of Major, the treatment effect of serving under a high quality mentor results in a 29 percent increase in the likelihood of early promotion to Major.

Before we provide an interpretation on our variable of interest, it is useful to discuss coefficient estimates on some of the control variables. Company commanders who are nonwhite are less likely to be promoted early, controlling for observables. The lower promotion rate for nonwhite company commanders may be evidence of a lack of type-based mentoring opportunities; 21 percent of all company commanders are nonwhite, compared to 14 percent of all battalion commanders.[22] The estimate on married Captains is marginally significant and suggests a higher likelihood of early promotion. Marital status is not visible to a promotion board, suggesting that marriage is positively correlated with unobservable factors increasing promotion. Estimates on SAT controls in column 2 are statistically significant and increasing in magnitude across SAT quartiles. This suggests that ability, as measured by the SAT, correlates with increasing probability of early promotion. Note that the measured ability effect goes away with the inclusion of college selectivity ranking and source of commission (column 3), both of

[20] To test for time- and unit-varying mission complexity, we added interactions of unit with the year in which the company commander took command to the column 4 specification. The point estimate on our variable of interest (ever had a high performing mentor) was unchanged and remained significant.
[21] Probit marginal effects estimates for the specifications used in Tables 4 and 5 are identical to three decimal places.
[22] See Appendix 1 for a discussion on differential high quality mentor effects by mentor and protégé race.

which are correlated with SAT quartile.[23] Only the nonwhite control remains statistically significant for the full specification shown in column 4. The results in Table 4 provide compelling evidence that high quality mentors impact their protégés' promotion prospects, and that this finding is robust to inclusion of an exhaustive set of observables.

To better understand how high performing mentors influence promotion, we next control for mentorship durations.[24] If high performing mentors are more productive at developing their protégés, we would expect the likelihood of subsequent early promotion for protégés to be increasing in the length of the mentorship. Panel A of Table 5 reports estimates of a modified version of equation (1) above in which the independent variable of interest, M_i, now represents months spent with a high performing mentor, and the coefficient of interest, δ, represents the impact of an additional month with a high performing mentor on the likelihood of early promotion to Major. In the naïve specification (column 1), one additional month spent with a high performing mentor increases the likelihood of early promotion to Major by 0.19 percentage points. In the full specification (column 2), an additional month with a high performing mentor raises the likelihood of promotion by 0.17 percentage points. Evaluated at the sample average duration of a high quality mentorship, 12.97 months, the specification in column 2 predicts a 2.2 percentage point, or 24 percent, increase in the likelihood of early promotion. The estimated effect of months under a high performing mentor is stable and significant across all specifications, and of comparable magnitude to the estimated effect of ever having a high performing mentor in Table 4.

[23] The impact of college selectivity indicators is discussed in detail in Appendix 1.
[24] Roughly 44 percent of company commanders served under a high performing battalion commander. Conditional on ever serving under a high performing mentor, the average duration of the high quality mentorship is 12.97 months.

To test for the differential impact of having more than one high performing mentor, we estimate an alternative version of equation (1) in which we include separate mentor quality indicators for having exactly one or two high performing mentors (Panel B of Table 5). The treatment effect of exactly one mentor is nearly identical to Table 4, and the effect of a second mentor (+0.021 in column 2) is of comparable magnitude to having only one high performing mentor.[25] The effect of having more than one high quality mentor is not statistically significant because only 5.72 percent of our company commanders had more than one high quality mentor.

Finally, we test whether the impact of a high quality mentorship on subsequent early promotion varies by protégé ability. We estimate versions of equation (1) separately for the top- and bottom-halves of the company commander SAT test score distribution (Panel C of Table 5). Columns 1 and 2 contain estimates for company commanders whose SAT test score is in the bottom half of the sample SAT test score distribution.[26] In the full specification (column 2), the effect of serving under a high performing mentor is roughly one-half that found in the pooled sample, and is not significant. Columns 3 and 4 display estimates from the same specification estimated over company commanders whose SAT scores are in the top half of the sample SAT score distribution. For these high ability company commanders, the impact of a high performing mentor on the likelihood of below the zone promotion to Major is more pronounced – increasing the likelihood of early promotion by more than 4 percentage points in the full specification (column 4). This effect is significant, and stable to the inclusion of all controls. When we condition on quartiles of the SAT distribution, we continue to find a positive and significant

[25] We also estimate the specifications reported in Panel B of Table 5 over the restricted sample of company commanders who had two battalion commander mentors. The point estimate on the "had two high performing mentors" indicator in the full specification was identical to that reported in column 2 of Panel B.

[26] We use a concordance table (Schneider and Dorans 1999) to assign total SAT scores to company commanders who only report ACT scores. The resulting median SAT score lies between 1140 and 1150, and our sample has more observations at 1140 than at 1150.

effect for the top two quartiles. We interpret these findings as suggestive that the impact of high performing mentors is increasing with protégé ability.

In summary, our main findings are: exposure to a high quality mentor increases early promotion; duration of exposure to a high quality mentor improves early promotion; exposure to multiple high quality mentors does not impact early promotion; and officers with high SAT scores receive the biggest early promotion lift from exposure to a high quality mentor.

VI. Interpretation and Potential Pathways

The reduced form mentorship estimates that we report should be interpreted as net effects. Relevant policy implications, however, require an understanding of the actual pathways through which these mentor effects operate. Although estimating the specific pathway effects is beyond the limit of our data, the estimated net effects in our study serve as a foundation for us to hypothesize and begin formalizing potential pathways for future study.

We began this paper with a discussion of the impact that General Marshall had on General Eisenhower's professional career, but there is quite a bit more to the story that helps inform our understanding of potential pathways. The linkage between Marshall and Eisenhower was actually a shared mentor, Major General Fox Conner.

Eisenhower and Conner first met over Sunday dinner in 1919. Months later, Eisenhower – at this point disillusioned with his career prospects after being twice threatened with courts martial – received a letter from Conner inviting him to serve with him in Panama. Over the next three years, Conner had a tremendous impact on Eisenhower. Eisenhower described "life with General Conner as a sort of graduate school in military affairs and the humanities, leavened by a man who was experienced in his knowledge of men and their conduct" (Eisenhower 1967, 187). When Eisenhower's career later seemed derailed by the inability to gain admittance to an Army

school, Conner intervened to secure a spot for him. Eisenhower subsequently graduated from the school first in his class. Clearly, Eisenhower possessed considerable potential, but Conner's mentorship – career advice, inspiration, professional development, and inclusion in key officer networks – enabled him to achieve greatness. We use this illustration, along with the results from our study, to highlight potential pathways through which mentor effects may operate.

The first pathway that labor economists typically focus on is the role of mentorships in producing human capital, both general and firm-specific. Fox Conner directed Eisenhower's study of hundreds of classic texts, from Plato to Clausewitz, which developed the young officer's acumen in devising strategy. If high performing mentors are more productive in developing human capital, we would expect increased production, plausibly manifesting in faster promotions. Laband and Lentz (1999) find higher promotion rates to partner for lawyers who previously reported having a mentor. Blau *et al.* (2010) exploit an experiment in which female junior faculty were assigned senior female economist mentors and find significant increases in publications for the treatment group.[27] We find that high performing mentors significantly increase the subsequent early promotion rates of their protégés, and this effect is increasing in mentorship duration (cf. Table 5, Panel A). While this evidence is consistent with mentorships providing human capital formation, it is also consistent with several alternative mentorship mechanisms.

A second pathway through which mentorships may work is signaling and screening. As Eisenhower's rater, Connor provided the Army a valuable signal regarding Eisenhower's potential via his evaluation report.[28] More generally, firms may invest in mentorships to identify

[27] In Blau *et al.* (2010), it is not possible to disentangle the relative impacts of human capital development from role-model effects and network effects.
[28] Conner described Eisenhower as "one of the most capable, efficient, and loyal officers I have ever met" (Cox 2011, 90).

high-potential employees when employee quality is not directly observable or difficult to quantify. In this context, high performing mentors may better be able to recognize high potential in their protégés, as well as be more skilled at touting their protégés in written evaluations and recommendations. Recall that our study does not reveal the quality of the rater in the evaluation report. Therefore, we do not have a mentor quality signaling effect, yet we still find that high performing mentors have the greatest early promotion impact on high ability protégés. We also find evidence that screening precision increases with the duration of the mentor relationship.

A third pathway through which mentorships may operate is networks. Conner's advocacy for Eisenhower was essential for gaining access to senior leaders within the Army and subsequently securing key assignments. In fact, Eisenhower's appointment to the Plans Division by Marshall, which launched his accelerated ascent to Supreme Allied Commander, was a direct result of Marshall being a part of Conner's network. When mentors recommend a promising protégé to a colleague, the protégé benefits from the weak-tie relations shared with those in his mentor's network (Granovetter 1973). High performing mentors may have larger within-organization networks or may be more adept at using weak-tie relationships. Here, our key findings provide mixed support. We find no differential impact of having multiple high performing mentors, which suggests that networks may be less important in this context. In contrast, our finding that promotion probabilities increase with months served under a high performing mentor supports a networking mechanism.

Preferential treatment, sometimes referred to as nepotism, is a fourth pathway through which mentor effects may operate. Fox Conner's lasting influence on Eisenhower's military career may also have been a result of preferential treatment. Selective attention drives the formation of most voluntary mentorships. One contemporary example of opportunities provided

by preference rather than objective qualifications is the impact of affirmative action legislation on college admissions: Admissions standards can vary by race. Most of the existing empirical evidence on racial preferences in college admissions (Light and Strayer 2002; Arcidiacono 2005) finds, however, that outcomes such as college completion and post-college earnings are not significantly different for groups receiving preference in admissions. Theoretical treatments of preferential role model effects in the literature (Athey, Avery, and Zemsky 2000; Chung 2000) focus on type-based mentoring whereby same-sex and same-race mentors can improve workplace diversity over time.[29] The design of our natural experiment prevents us from detecting preferential treatment based on observable characteristics (Table 3). Moreover, the use of anonymous promotion boards prevents direct influence on officer promotions. The only evidence we have on preferential treatment effects is the fact that high performing mentors seem to have the largest impact on high ability protégés, which suggests some form of type-based preference mentoring.

A fifth pathway, role model or motivational effects, is well-documented: an inspirational teacher, coach or supervisor can shape a protégé's decisions (e.g. choice of college major, occupation or job assignment) and encourage the protégé to work toward specific professional goals. When staff officers told Eisenhower "he would probably fail" at the Army school, Conner assured him that he was "far better trained and ready for [the school] than anybody I know" (Eisenhower 1967, 201). Where the mentor has already attained a prominent position within the organization (e.g. partner at a law firm, tenured professor at a university, or early promotion to Major within the Army), emulating the example of high performing mentors should speed a

[29] Carrell, Page, and West (2010) document a gender-based role model effect when students are randomly assigned course instructors: Controlling for student and teacher characteristics, women who have female professors for required introductory courses in science and mathematics perform better in those courses and are more likely to complete majors in science, technology, engineering and mathematics.

protégé's promotion. Role model effects are consistent with our empirical findings of both a differential effect of duration spent with a high performing mentor and ability-based matching.

A final pathway that we consider is how mentoring relationships can shape a protégé's adoption of organizational values. Conner advised Eisenhower to "always take the job seriously, never yourself" (Eisenhower 1967, 187), an axiom that Eisenhower often recited throughout his career. This process has been characterized in several ways: as the development of the "organization man" (Whyte 1956), the use of status to align incentives (Besley and Ghatak 2008), and inclusion of identity in the utility function (Akerlof and Kranton 2000). Where internal labor markets are crucial in developing talent, employees who closely identify with the organization's norms may be more effective in transmitting this sense of social identity, and hence more valuable. If high performing mentors are more effective in developing social identity in their protégés, their protégés should also experience faster promotion. Finding that early promotion probabilities are an increasing function of time spent with a high performing mentor is consistent with this theory of mentorship pathways.

Clearly, the impact of high performing mentors on their protégés can operate through multiple channels, and these effects are by no means mutually exclusive. A mentor can simultaneously serve as a role model, teacher and sponsor to his protégés. While we cannot fully disentangle the different mechanisms by which mentorships impact protégé careers, the preceding discussion suggests that protégés with high performing mentors should experience faster promotion than protégés with lower-performing mentors, a conclusion that our estimates support.

VII. Conclusion

Using a sample of active-duty U.S. Army officers, we find that serving under a high performing mentor significantly increases the likelihood that a junior officer protégé will be promoted early to the rank of Major. This finding remains stable to the inclusion of numerous demographic controls, and is robust across a variety of specifications. The magnitude of the increase in promotion rates is large, representing a 29 percent increase in the average early promotion rate. We also find the impact of high quality mentors on promotion increasing in the duration of the mentorship. These effects are most pronounced for protégés in the top half of the SAT distribution. We do not find an effect with exposure to an increasing number of high quality mentors.

Our empirical findings are consistent with the notion that mentoring relationships are complex and that mentors shape the careers of their protégés through multiple channels. These findings should be interpreted within the context of the unique culture, structure, and mission of the U.S. Army. Mentoring within the Army is essential given that the Army develops its senior leaders exclusively from within. The life and death implications from poor leadership further enhance the focus on mentoring within the military. As a result, our findings are probably an upper bound estimate on the impact of mentoring on promotion. In professional organizations outside the military, results may be less pronounced. Nevertheless, these findings suggest that high quality mentors can influence the career trajectories of their protégés and the impact can be rather substantial. Lieutenant Colonel Eisenhower's progression from relative obscurity to the rank of Supreme Allied Commander within three years and eventually to the 34th President of the United States is a testament, at least in part, to the important role of mentorship.

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Figure 1. Standard Configuration of a Typical Unit

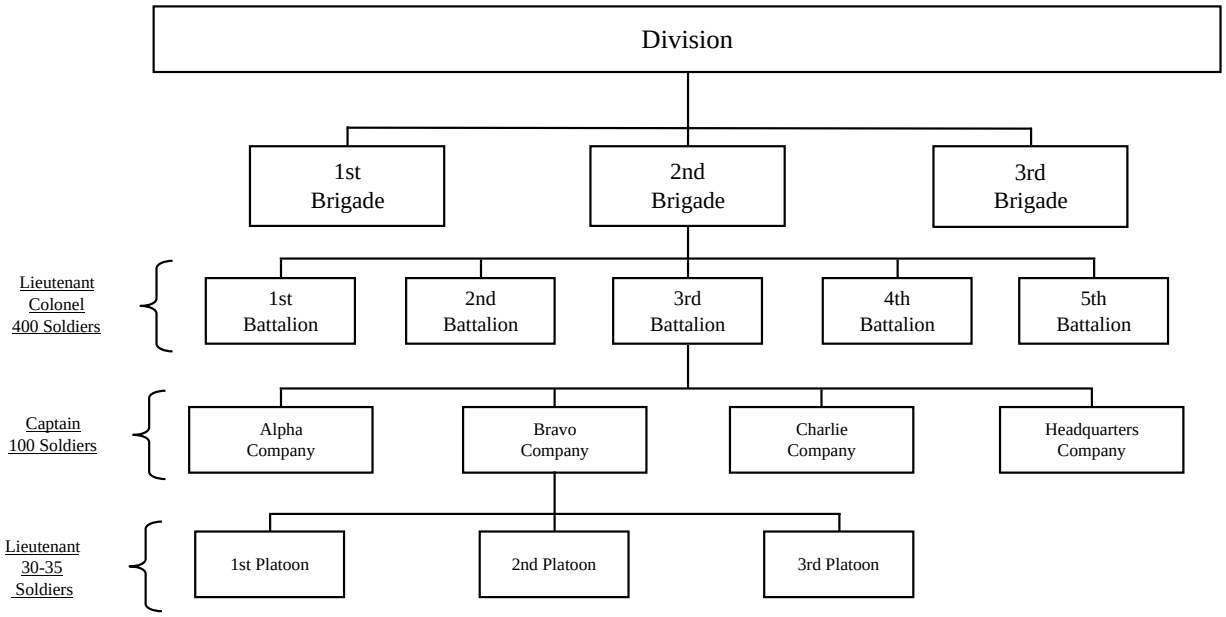


Table 1: Mentor (Battalion Commander) Summary Statistics

Variable	Population of All Possible Mentors (1998-2008)	Sample of Mentors Used in this Study (1998-2008)
	(1)	(2)
High performing (early promotion)	0.238 (0.426)	0.278 (0.448)
Non-white	0.117 (0.321)	0.137 (0.344)
SAT score	1155 (162)	1168 (154)
SAT missing	0.534 (0.499)	0.647 (0.478)
College rank: noncompetitive	0.069 (0.253)	0.071 (0.257)
College rank: minimally difficult	0.065 (0.246)	0.073 (0.260)
College rank: moderately difficult	0.400 (0.490)	0.439 (0.496)
College rank: very difficult	0.365 (0.482)	0.331 (0.471)
College rank: most difficult	0.009 (0.093)	0.007 (0.081)
College rank: missing	0.093 (0.290)	0.079 (0.270)
USMA	0.315 (0.464)	0.277 (0.448)
ROTC scholar	0.426 (0.495)	0.420 (0.494)
ROTC non-scholar	0.174 (0.379)	0.199 (0.399)
Other source of commission	0.086 (0.280)	0.104 (0.306)
Observations	3,179	2,131

NOTE. -- Standard deviations are in parentheses. Column 1 sample includes all Lieutenant Colonels who held that rank between 1998 and 2008. The sample in column 2 is a subset of column 1, and includes all Lieutenant Colonels who served as battalion commander mentors to a Captain who commanded a company between 1998 and 2008. College rank measures are from Peterson's Undergraduate Databases, 1983-1984 through 1998-1999. Sources of commission are the United States Military Academy (USMA), Reserve Officer Training Corps (ROTC), and other commissioning sources such as Officer Candidate School. SAT scores were not systematically collected across all commissioning sources prior to the 1990s, which explains the incidence of missing SAT scores for the mentors in our sample.

Table 2: Protégé (Company Commander) Summary Statistics

Variable	Population of All Possible Protégés (1998-2008)	Sample of Protégés Used in this Study (1998-2008)	Ever Had a High Performing Mentor	Never Had a High Performing Mentor
	(1)	(2)	(3)	(4)
Ever had a high performing mentor		0.437		
		(0.496)		
Early promotion	0.089	0.092	0.109	0.080
	(0.285)	(0.290)	(0.311)	(0.271)
Non-white	0.207	0.208	0.196	0.217
	(0.405)	(0.406)	(0.397)	(0.412)
Married	0.746	0.753	0.767	0.743
	(0.435)	(0.431)	(0.423)	(0.437)
SAT score	1139	1134	1135	1133
	(173)	(173)	(175)	(172)
SAT missing	0.187	0.187	0.184	0.188
	(0.390)	(0.390)	(0.388)	(0.391)
College rank: noncompetitive	0.025	0.026	0.030	0.022
	(0.156)	(0.159)	(0.172)	(0.148)
College rank: minimally difficult	0.064	0.072	0.065	0.077
	(0.245)	(0.258)	(0.246)	(0.267)
College rank: moderately difficult	0.492	0.490	0.492	0.488
	(0.500)	(0.500)	(0.500)	(0.500)
College rank: very difficult	0.090	0.090	0.092	0.089
	(0.287)	(0.287)	(0.289)	(0.285)
College rank: most difficult	0.325	0.319	0.318	0.319
	(0.469)	(0.466)	(0.466)	(0.466)
College rank: missing	0.004	0.003	0.003	0.003
	(0.059)	(0.056)	(0.052)	(0.059)
USMA	0.307	0.300	0.300	0.300
	(0.461)	(0.458)	(0.458)	(0.459)
ROTC 4 year scholar	0.060	0.062	0.061	0.063
	(0.237)	(0.241)	(0.240)	(0.242)
ROTC 3 year scholar	0.156	0.155	0.137	0.169
	(0.363)	(0.362)	(0.344)	(0.375)
ROTC 2 year scholar	0.166	0.167	0.164	0.170
	(0.372)	(0.373)	(0.370)	(0.376)
ROTC non-scholar	0.311	0.315	0.338	0.298
	(0.463)	(0.465)	(0.473)	(0.457)
Months deployed	4.902	4.512	4.217	4.741
	(11.106)	(5.512)	(5.383)	(5.601)
Observations	5,070	4,142	1,812	2,330

NOTE. -- Standard deviations are in parentheses. See Table 1 notes for variable descriptions. Column 1 contains all male officers who were Captains between 1998 and 2008, who were commissioned from either USMA or ROTC, who served in the combat arms branches, and who remained in the Army until 10 years of service. Column 2 is a subset of column 1 and represents our final selected sample of Captains who served as company commanders between 1998 and 2008, have compete information on time in command, and can be linked to their battalion commander mentors. Columns 3 and 4 report summary statistics by whether the company commander ever served under a high-performing mentor. Early promotion is an indicator equal to 1 for Captains subsequently promoted early to Major. The mean difference in early promotion rates (between columns 3 and 4) by ever had a high performing mentor status is +2.9 percentage points and is statistically significant at the five percent level. We report sample proportions for officers commissioned through ROTC by scholarship type. Officers from other commissioning sources are excluded, as they are significantly older and have prior military experience. Months deployed is measured at 6 years of service in column 1 and the start of company command in column 2. The use of different measures is necessary as not all Captains in column 1 have complete information on time in company command. Mean cumulative months deployed at 6 years of service for our column 2 company commanders is 4.974, with a standard deviation of 11.19 months, nearly identical to the mean and standard deviation cumulative months deployed reported in column 1.

Table 3: Control Variable Correlations with Variable of Interest

Dependent Variable: Ever Had a High Performing Mentor

Variable	(1)	(2)	(3)	(4)	(5)
Non-white	-0.032	-0.027	-0.032	-0.021	-0.004
	(0.020)	(0.020)	(0.020)	(0.020)	(0.025)
Married	0.029	0.023	0.024	0.024	0.014
	(0.018)	(0.018)	(0.018)	(0.018)	(0.022)
SAT in third highest quartile	0.017	0.023	0.026	0.026	0.017
	(0.025)	(0.025)	(0.024)	(0.024)	(0.030)
SAT in second highest quartile	0.036	0.041	0.043	0.044	0.038
	(0.029)	(0.029)	(0.028)	(0.028)	(0.035)
SAT in highest quartile	0.039	0.042	0.038	0.035	0.023
	(0.032)	(0.032)	(0.032)	(0.032)	(0.040)
SAT Missing	-0.017	0.002	0.006	0.009	0.000
	(0.025)	(0.025)	(0.025)	(0.025)	(0.032)
College rank: noncompetitive	0.074	0.074	0.075	0.087	0.085
	(0.050)	(0.050)	(0.049)	(0.049)	(0.065)
College rank: minimally difficult	-0.038	-0.036	-0.035	-0.024	0.004
	(0.031)	(0.031)	(0.030)	(0.030)	(0.039)
College rank: very difficult	0.014	0.006	0.003	0.005	0.012
	(0.028)	(0.028)	(0.028)	(0.028)	(0.035)
College rank: most difficult	-0.010	-0.006	-0.006	-0.001	0.023
	(0.059)	(0.058)	(0.055)	(0.055)	(0.067)
College rank: missing	-0.035	-0.037	-0.025	-0.040	0.037
	(0.136)	(0.135)	(0.132)	(0.142)	(0.194)
ROTC 4 year scholar	-0.004	0.001	0.009	0.016	0.026
	(0.062)	(0.062)	(0.059)	(0.059)	(0.075)
ROTC 3 year scholar	-0.043	-0.040	-0.035	-0.028	0.016
	(0.062)	(0.061)	(0.058)	(0.058)	(0.070)
ROTC 2 year scholar	0.011	0.026	0.010	0.018	0.027
	(0.063)	(0.063)	(0.060)	(0.060)	(0.073)
ROTC non-scholar	0.060	0.048	0.028	0.039	0.045
	(0.062)	(0.062)	(0.058)	(0.058)	(0.071)
Months deployed	-0.004*	-0.001	-0.001	-0.002	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Above Center of Mass rating on evaluation prior to command					0.012
					(0.019)
Year group controls	No	Yes	Yes	Yes	Yes
Branch controls	No	No	Yes	Yes	Yes
Unit controls	No	No	No	Yes	Yes
Observations	4,142	4,142	4,142	4,142	2,573
R^2	0.01	0.02	0.05	0.08	0.08

NOTE. -- Heteroskedastic robust standard errors are in parentheses. All regressions include a constant. Year group controls account for the fact that the Army manages officers by their year of entry cohort. Officers in this sample are in one of six combat arms branches (infantry, armor, field artillery, engineers, air defense artillery, and aviation). The excluded college rank category is "moderately difficult." For column 4, an F test for the joint significance of all the non-structural officer characteristics (race, marital status, SAT quartile, college rank, commissioning source, and months deployed) had a p-value of 0.284. Column 5 includes an indicator if a Captain received an Above Center of Mass box check on his last evaluation prior to taking company command. Although data on the box check rating is missing for nearly 38 percent of our sample, officer demographic characteristics for Captains with and without box check information are comparable.

* $p < 0.05$

Table 4: Impact of Mentor Quality on Protégé's Early Promotion Likelihood
Dependent Variable: Protégé (Company Commander) Promoted Early to Major

Variable	(1)	(2)	(3)	(4)
Ever had high performing mentor	0.028*	0.026*	0.028*	0.027*
	(0.010)	(0.010)	(0.010)	(0.010)
Non-White		-0.024*	-0.025*	-0.024*
		(0.011)	(0.011)	(0.011)
Married		0.016	0.017	0.021*
		(0.010)	(0.010)	(0.010)
SAT in third highest quartile		0.029*	0.006	0.004
		(0.014)	(0.014)	(0.014)
SAT in second highest quartile		0.038*	-0.019	-0.021
		(0.014)	(0.017)	(0.017)
SAT in highest quartile		0.041*	-0.032	-0.034
		(0.015)	(0.020)	(0.020)
SAT Missing		-0.002	0.012	0.014
		(0.013)	(0.013)	(0.013)
College rank: noncompetitive			-0.002	-0.004
			(0.024)	(0.024)
College rank: minimally difficult			-0.004	-0.001
			(0.015)	(0.016)
College rank: very difficult			0.029	0.033
			(0.017)	(0.017)
College rank: most difficult			0.068	0.065
			(0.040)	(0.041)
College rank: missing			-0.074*	-0.081*
			(0.014)	(0.021)
ROTC 4 year scholar			0.023	0.019
			(0.043)	(0.044)
ROTC 3 year scholar			0.019	0.016
			(0.044)	(0.044)
ROTC 2 year scholar			-0.018	-0.023
			(0.043)	(0.043)
ROTC non-scholar			-0.043	-0.049
			(0.042)	(0.042)
Months deployed			0.001	0.001
			(0.001)	(0.001)
Unit controls	No	No	No	Yes
Observations	4,142	4,142	4,142	4,142
R^2	0.01	0.01	0.03	0.04

NOTE. -- Standard errors (parentheses) are corrected for clustering at the mentor level. All regressions contain a constant, branch controls year group controls, and other controls added as indicated. See Tables 2 and 3 for sample and variable descriptions.
* $p < 0.05$

Table 5: Months Under High Performing Mentors, Number of High Performing Mentors, and Mentor Effects by Protégé's Ability

Dependent Variable: Protégé (Company Commander) Promoted Early to Major

	Panel A: Months Under A High Performing Mentor		Panel B: Number of High Performing Mentors		Panel C: High Performing Mentor and Protégé's SAT Scores			
					Bottom Half of SAT Distribution		Top Half of SAT Distribution	
Variable	(1)	(2)	(1)	(2)	(1)	(2)	(3)	(4)
Months mentored by a high performing mentor	0.0019* (0.0006)	0.0017* (0.0006)						
Had one high performing mentor			0.029* (0.010)	0.028* (0.010)				
Had two high performing mentors			0.023 (0.021)	0.021 (0.021)				
Ever had a high performing mentor					0.013 (0.014)	0.015 (0.014)	0.044* (0.016)	0.041* (0.016)
Demographic and unit controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	4,142	4,142	4,142	4,142	1,715	1,715	1,654	1,654
R-squared	0.01	0.04	0.01	0.04	0.01	0.05	0.02	0.05

NOTE. -- Standard errors (parentheses) are corrected for clustering at the mentor level. All regressions contain a constant, branch controls, year group controls, and other controls added as indicated. See Tables 2 and 3 for sample and variable descriptions. We drop all individuals with missing SATs in Panel C. The median SAT score lies between 1140 and 1150. Since our sample has more observations at 1140 than 1150, the number of observations in Panel C is not equivalent for each half of the SAT distribution.

* $p < 0.05$

Appendix 1

Appendix 1contains a description of variables and the qualification rules for our sample, along with a brief description of the findings from several alternative specifications implemented as robustness checks.

Variable Descriptions

Captains who are married when they begin company command are coded as married in our sample. All other officers have a value of zero for the married indicator. Marital status is known by a protégé's rater, but is not visible to promotion boards. Since marital status may signal acceptance of and adherence to organizational norms, we include it as a control.

The large number of missing SAT scores for our mentors (battalion commanders) occurs because test scores of officers commissioned from sources other than the Army's service academy, the United States Military Academy, were not systematically collected prior to the 1990s. The incidence of missing SAT scores is significantly lower for our sample of protégés. A concordance table is used to convert ACT scores into SAT equivalents.

College rank indicators used for both mentors and protégés are obtained from a database of Peterson's Annual Guides to Undergraduate Study: Four-Year Colleges from 1983-1984 to 1998-1999. Peterson rankings measure the overall difficulty of gaining admittance to the school. The definitions for each of the five admissions selectivity categories are listed below:

Noncompetitive: Virtually all applicants were accepted regardless of high school rank or test scores.

Minimally difficult: Most freshmen were not in the top half of their high school class and scored below 900 on the SAT (verbal and mathematical combined) or below 19 on the ACT (composite); up to 95 percent of the applicants were selected.

Moderately difficult: More than 75 percent of the freshmen were in the top half of their high school class and scored over 900 on the SAT or over 18 on the ACT; about 85 percent or fewer of the applicants were selected.

Very difficult: More than 50 percent of the freshmen were in the top 10 percent of their high school class and scored over 1150 on the SAT or over 26 on the ACT; about 60 percent or fewer of the applicants were accepted.

Most difficult: More than 75 percent of the freshmen were in the top 10 percent of their high school class and scored over 1250 on the SAT or over 29 on the ACT; about 30 percent or fewer of the applicants were accepted.

The Army's service academy, the United States Military Academy (USMA), is ranked as most difficult. In our sample, officers who attended more than one undergraduate institution are assigned the ranking of the institution that granted their degree. Officers commissioned prior to 1984 were assigned the 1983-1984 Peterson ranking for their degree-granting institution.

The Army commissions officers from a variety of sources. For the 1992 through 1999 commissioning cohorts, USMA produced roughly 18 percent of officers commissioned into the active-duty Army. The Reserve Officer Training Corps (ROTC) sponsored military training at more than 350 colleges and universities during this time, and produced roughly 53 percent of officers commissioned into the active-duty Army. Some ROTC cadets receive no scholarship support from the Army, and are referred to as ROTC non-scholars. All other ROTC cadets receive scholarships covering from 2 to 4 years, with 4-year scholarships being the most competitive. The remaining 29 percent of active-duty officers commissioned into the Army during this time came from either Officer Candidate School (OCS), roughly 7.5 percent, or direct commissions (chaplains, lawyers and medical professionals), roughly 21.5 percent. Officers commissioned through OCS are disproportionately former enlisted personnel with 10 or more years of active-duty service, so they are typically older and have lower educational attainment than officers from other commissioning sources. Officers receiving direct commissions are subject to different promotion timetables, and are not typically eligible for early promotion. As a result, we drop all OCS and direct commission

officers from our sample of company commanders. We include controls for the source of commission as well as the type of ROTC program (scholarship receipt and duration) in all our models.

Months deployed is calculated at the beginning of company command (or at 6 years of service for Captains who have missing company command start dates), and measures the cumulative time officers have served in a combat zone since receiving their commission. Army personnel receive imminent danger pay (also called hostile fire pay) for each month spent in an area classified as a combat zone, which is how we identify deployment durations. Officers with greater deployment time may have a higher likelihood of early promotion to Major, so we control for cumulative months deployed prior to the start of company command in all our specifications.

Since the Army manages officers by cohort, to include when officers are eligible for promotions, we include controls for the year in which a Captain was commissioned in all specifications. Captains in our sample were commissioned in the calendar years 1992 through 1999, and served as company commanders at some time between 1998 and 2008.

Officers in the Army serve in one of sixteen occupational branches. The infantry, armor, engineer, aviation, air defense and field artillery branches are collectively referred to as the combat arms branches. Officers in the combat arms branches are more homogeneous relative to the other ten branches, and have slightly higher probabilities of early promotion to Major. Therefore, our sample only contains officers in combat arms branches, and we include branch controls in all specifications.

Captains who are about to take company command are assigned to a particular post, and then assigned to a unit at that post. Within that unit, they are then assigned to a brigade or battalion and placed in charge of a particular company. Since unit reputation effects may attach to Captains who complete company command in prestigious units – such as Airborne divisions or a Ranger regiment – we include 25 unit controls in all of our regressions that have below the zone promotion to Major as the outcome of interest.

Sample Qualification Rules

To isolate the impact of high performing mentors on protégé promotion, we selected a final sample that was relatively homogeneous along observable characteristics such as occupational branch, commissioning source and officer gender.

From our sample of all Captains who were company commanders at any time between 1998 and 2008, we excluded observations with missing information on months deployed and officers who went before the promotion board to Major but have missing data on early promotions.

Because screening criteria and observable officer demographics such as age, education and military experience differ significantly for officers commissioned directly or through OCS as compared to officers commissioned from ROTC and USMA, we restrict commissioning sources to ROTC and USMA for our company commander sample.

Since early promotion to Major is higher for officers in the combat arms branches than in the entire Army, protégés in these occupational branches are more likely to serve under a high performing mentor, and to be promoted early themselves. We restrict our sample of protégés to Captains serving as company commanders in the combat arms branches.

Within the combat arms branches, women are restricted from serving in certain branches and positions. As a result, we restrict our sample of protégés to include only male officers from these branches.

Company commanders had to remain on active-duty service long enough to go before the Major promotion board. We condition our sample on officers who complete company command, stay to 10 years of service, and who have complete information on time in company command and mentor quality. Column 1 of Table 2 reports summary statistics for the 5,070 male Captains serving in a combat arms branch who were commissioned from USMA or ROTC. In addition, the Captains in column 1 remained on active-duty until 10 years of service. For roughly 18 percent of our column 1 Captains, we have either incomplete information on time in company command

or are unable to link company commander protégés to their battalion commander mentors. Our final sample consists of 4,142 company commanders. As columns 1 and 2 of Table 2 demonstrate, our selected company commander sample is comparable to the pool of Captains from which it is drawn on all observables.

Additional Robustness Checks

Sensitivity of Results to Missing SAT Score and College Rank Information

To confirm that the estimates reported in Table 3 are not sensitive to the inclusion of observations with missing SAT or college rank information, we estimated the model specifications reported in Table 3 over the 3361 company commanders with non-missing college rank and SAT scores. The resulting parameter estimates were similar, and none of the control variables were significant in the Table 3, column 4 specification. The regression R^2 estimates for specifications estimated over the restricted sample were identical to those for the full sample.

Significance of College Rank Indicators

In specifications of Table 4 that include only college rank indicators, the point estimates on "very difficult" (+0.029) and "most difficult" (+0.063) college rank indicators are each statistically significant. Moreover, the point estimate on the "most difficult" indicator is significantly different from the point estimate on the "noncompetitive" indicator. Once SAT quartile controls are added (column 3 of Table 4), the impact of having attended a "very difficult" or "most difficult" institution remains positive and significant. When both SAT indicators and source of commission indicators are included (column 4 of Table 4), none of the college rank indicators are individually significant. This result is driven by the high correlation of the "most difficult" college rank with the USMA source of commission indicator.

Impact of High Performing Mentors by Race

To identify differences in early promotion rates based on mentor and protégé race, we estimated specifications that interacted protégé race with the ever had a high performing mentor indicator. These specifications were estimated over the entire sample and on restricted subsamples conditioned on mentor race. The interaction of the high performing mentor indicator with protégé race indicator was significant only for white protégés. Specifications that conditioned on mentor race resulted in imprecise measurement of the impact of high performing mentors due to smaller sample sizes.

We tested for race-based matching effects in mentorships by interacting mentor-protégé same-race indicators with ever had a high performing mentor. These interactions were not significant in any of the specifications.

Correcting Standard Errors for Clustering by Mentor

Battalion commanders frequently mentor multiple company commanders, so correlated shocks are possible across company commanders sharing the same mentor. Many company commanders serve under more than one battalion commander, which complicates any attempt to correct for correlated shocks with clustered standard errors. We define clusters based on unique combinations of mentors. Consider the following examples:

Company commander A served first under battalion commander 1 for 12 months and then under battalion commander 2 for 8 months; and

Company commander B served first under battalion commander 1 for 4 months and then under battalion commander 2 for 14 months; and

Company commander C served first under battalion commander 2 for 16 months and then under battalion commander 1for 6 months.

Company commanders A, B and C are all assigned to the unique mentor cluster of having the common treatment of battalion commanders 1 and 2.

Company commander D served first under battalion commander 2 for 8 months and then under battalion commander 3 for 12 months.

Company commander D is assigned to the unique mentor cluster of having the common treatment of battalion commanders 2 and 3.

Company commander E served under battalion commander 3 for 16 months, while company commander F served under battalion commander 3 for 21 months.

Company commanders E and F are assigned to the unique mentor cluster of having the common treatment of battalion commander 3 exclusively.

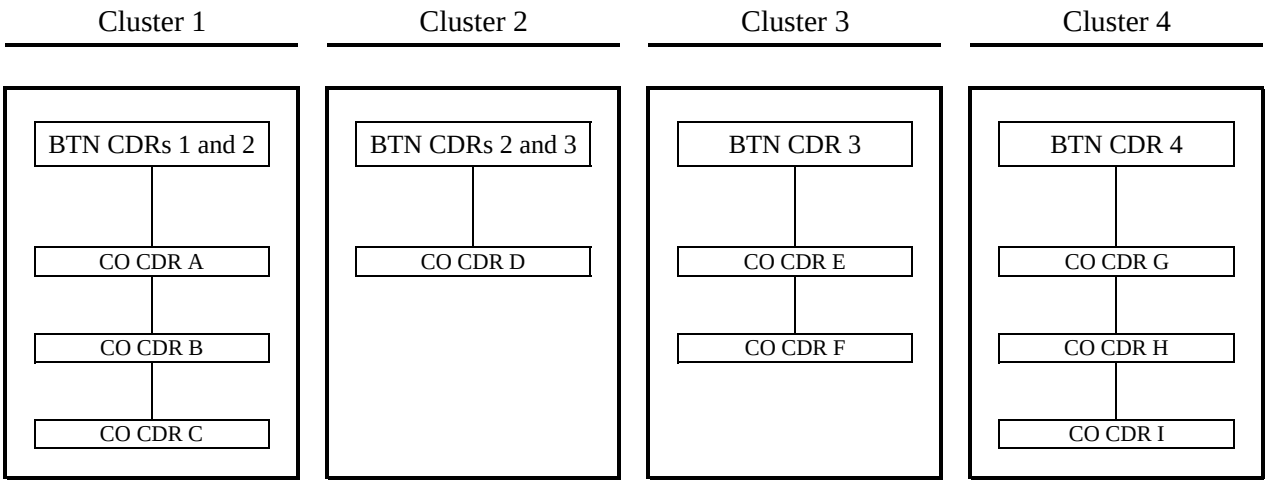
Company commanders G, H and I all served under battalion commander 4 for 18 months.

Company commanders G, H and I are assigned to the unique mentor cluster of having the common treatment of battalion commander 4 exclusively.

{Insert Figure 2 here}

In Figure 2 above, BTN CDR denotes a battalion commander, and CO CDR denotes a company commander. Controlling for mentor effects using the clustering methodology described above yields 2,369 unique mentor clusters. We use this approach to correct our standard errors for clustering in Table 4 and Table 5.

Figure 2. Construction of Mentor Clusters



NOTE. -- BTN CDR denotes a mentor (Lieutenant Colonel) serving as a battalion commander; CO CDR denotes a protégé (Captain) serving as a company commander. All company commanders who served under the same unique grouping of battalion commanders are included in the same cluster.