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THESIS

**THE EFFECTS ON U.S. NAVY DIVERSITY
WITH THE REMOVAL OF OFFICER PHOTOS
FROM PROMOTION SELECTION BOARDS**

by

Jessie N. Peralta

March 2022

Thesis Advisor:
Co-Advisor:

Sae Young Ahn
Marigee Bacolod

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OF OFFICER PHOTOS FROM PROMOTION SELECTION BOARDS**

Jessie N. Peralta
Lieutenant Commander, United States Navy
BS, Old Dominion University, 2006

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Approved by: Sae Young Ahn
Advisor

Marigee Bacolod
Co-Advisor

Marigee Bacolod
Academic Associate, Department of Defense Management

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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

AEDO	aviation duty officer (engineering)
AMDO	aviation duty officer (mechanic)
AQD	additional qualification designator
ASW	anti-submarine warfare
AZ	above-zone
BUPERS	Chief, Bureau of Naval Personnel
BZ	below-zone
CAPT	captain
CDR	commander
CEC	civil engineering corps
CHC	chaplain corps
CNP	Chief of Naval Personnel
CWE	cyber warfare engineer
DC	dental corps
DMDC	Defense Manpower Data Center
DOD	Department of Defense
DODBDI	Department of Defense Board on Diversity and Inclusion
DOPMA	Defense Officer Personnel Management Act
EDO	engineering duty officer
FAO	foreign area officer
FITREP	fitness report
FMFQO	Fleet Marine Force Qualified Officer
FY	fiscal year
HR	human resources
INT	intelligence
IP	information professional
IWC	Information Warfare Community
IZ	in-zone
JAG	Judge Advocate General
JPME	Joint Professional Military Education

LCDR	lieutenant commander
LDO	limited duty officer
LT	lieutenant
MLDC	Military Leadership Diversity Commission
NROTC	Naval Reserve Officer Training Corps
OCEANO	oceanography officer
OCS	Officer Candidate School
OMB	Office of Management and Budget
OMPF	official military personnel file
PAO	public affairs officer
PMP	permanent military professor
PSB	promotion selection board
PSR	performance summary report
SC	supply corps
SECNAV	Secretary of the Navy
URL	unrestricted line

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I. INTRODUCTION

A. BACKGROUND

The United States Navy is one of the most diverse organizations globally. However, major racial, ethnic, and gender disparities continue to exist. Although the Department of Defense (DOD) implements various working groups to increase minority and gender inclusion and diversity in the military, the issue persists, particularly among the senior officer ranks. The current study is inspired by the Chief of Naval Personnel (CNP) Vice Admiral John Nowell Jr.'s statement in 2021, indicating that removing officer photos from scrutiny by the promotion boards harmed diversity. This study aims to provide a perspective of the promotion process, and in particular, how masking photos in promotion boards may or may not improve diversity and inclusion in the officer ranks.

Opportunities for minorities and females in the military have increased since President Truman signed Executive Order No. 9981 (1948) and desegregated the military. Additionally, the Armed Services Integration Act of the same year allows women to serve as “permanent, regular members of the armed forces.” At a closer look, however, the minority and gender disparity of the Navy becomes more apparent. For example, the enlisted ranks are more diverse than the officer ranks, and the senior officer ranks are less diverse than the junior officer ranks. According to the Demographic Profile of the Military (DOD, 2020), minorities, including American Indian or Alaskan native, Asians, Black or African American, Hispanics, Native Hawaiian or other Pacific Islanders, and multiple race sailors make up 37.6 percent of the total active-duty U.S. Navy end strength. Whites make up 62.4 percent of total active-duty Navy end strength. The remaining percentage declined to respond. The report also shows that the racial gap is less in the active duty enlisted ranks, with 40.4 percent minorities and 59.6 percent White. In contrast, the gap is more comprehensive with officers. For example, the minorities make up 23.4 percent of the active-duty officer ranks, while Whites make up 76.6 percent. Finally, females make up approximately 20 percent of the total force, 20.4 percent in the enlisted ranks, and 19.9 percent in the officer ranks. Compared to the U.S. population, Whites contribute to 61.6

percent, Hispanics 18.7 percent, Blacks 12.4 percent, Asians 6 percent, and Native Pacific Islanders, 0.2 percent according to the U.S Census Bureau (2021).

Since Truman ended military segregation, improving race and gender relations in the Department of Defense (DOD) has remained a continuous effort. Although the military is more diverse today than during Truman's presidency, it has experienced minor progress with diversity among the senior officer ranks (DOD Board on Diversity and Inclusion, 2020). The recognition of this trend led to the creation of the Military Leadership Diversity Commission (MLDC) in 2009. However, nearly a decade after the MLDC report was published, the minority and gender disparity persist within the senior officer ranks. In 2020, the Secretary of Defense, Mark T. Esper, published two memorandums to promote diversity and inclusion in the military by ordering nine immediate actions to be completed by December 2020. One of the immediate actions he directed was the removal of photographs from the promotion and selection board process.

Since 2016, photos have been removed and reinstated twice in the promotion selection board. The policy change in 2020 is the third change in four years. In August 2021, a year after the latest change, the CNP stated that removing photos from the officer promotion boards hurt diversity. It is not a priori clear how displaying photographs could harm or help diversity in promotions. For example, if racial bias exists among board selection members, photographs that display candidates' race could harm their chances of promotion. In such a case, masking photos should have resulted in an increase in racial diversity among those promoted. Others would argue that officers are promoted based on their ability to perform at the next rank and not on the basis of race; photographs should then have no bearing on one's chances for promotion. To evaluate whether the photo masking policy harms or helps diversity in promotions and the accuracy of CNP's statement, we compare the outcomes of the promotion boards before and after the photo masking policy changes. Unfortunately, no studies currently exist that examine this.

Previous military studies analyze the careers of minorities to show minorities and women promote at a slower rate than white men (Asch, Miller, & Malchiodi, 2012; Asch, Miller, & Weinberger, 2016; Hosek et al., 2001). This current study differs in that it examines a policy change to determine whether the board decisions reflect more diversity

and inclusion for minority and female Naval officers when photos are shown or not shown during the promotion selection board (PSB). The study also analyzes the board's racial, ethnic, and gender composition to determine if the composition of the promotion selection board members affects promotion outcomes.

Due to the limited availability of PSB member data, the study's scope is narrowed to the active-duty line and staff corps officers who are eligible to promote during the PSBs for O4 to O6 in FY17 through FY22. Reservist and chief warrant officer selection boards are also omitted from the study.

B. RESEARCH QUESTIONS

What effect do obscured photos have on the promotion outcomes of naval officers? Do the effects vary by ethnicity and gender? What impact does the ethnic and gender composition of the selection board have on the promotion rates of minority and female officers?

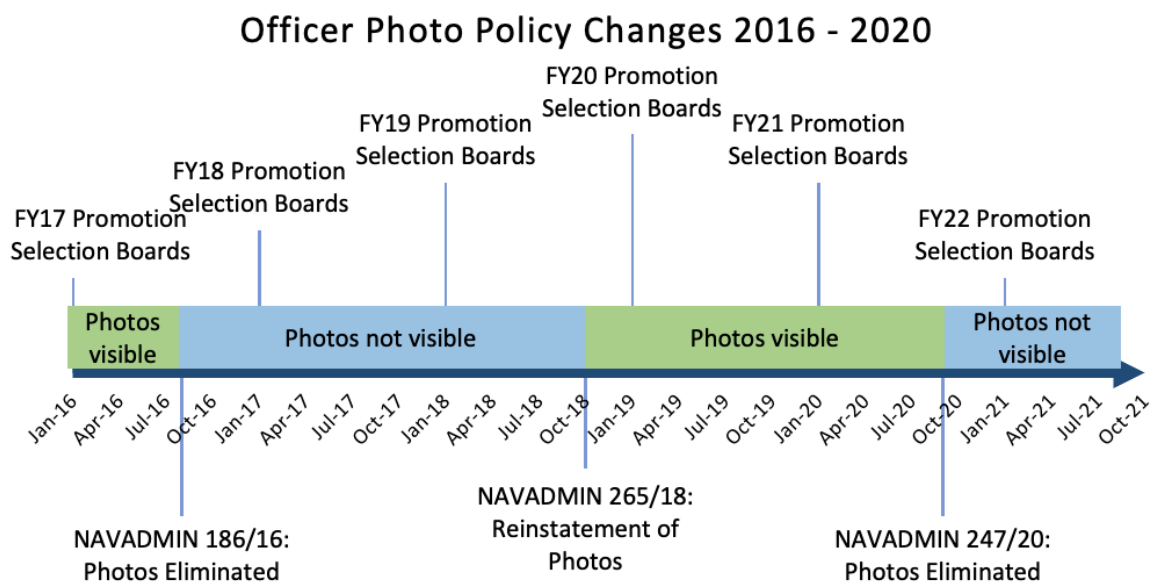
C. POLICY CHANGES

The first policy change stems from the publication of NAVADMIN 186/16, "Elimination of the Requirement to Display the Officer Photograph During Selection Boards" (2016), which removes the photos on the promotion selection boards. The photos returns to the promotion boards in 2018 with the release of NAVADMIN 265/18 "Reinstatement of the Requirement to Display the Officer Photograph During the Selection Board." The latest change occurs with the release of NAVADMIN 247/70, "Elimination of the Display of the Officer Photograph During Selection Boards" (2020), which eliminates the photos a second time during the assessed time period.

The three policy changes occur after the promotion selection boards had convened for their respective fiscal year (FY). Therefore, the changes affect the boards for the subsequent FY. For example, when the Navy released NAVADMIN 186/16: Elimination of the Photos, the FY17 officer promotion selection boards had convened from January to June 2016. Therefore, the photos are not visible on the selection boards during FY18, FY19, and FY22. Correspondingly, NAVADMIN 265/18: Reinstatement of the Photos,

released in October 2018, after the FY19 boards. Therefore, the photos are visible for the promotion boards in FY20 and FY21. Figure 1 shows the policy changes from 2016 through 2021 and the officer promotion selection boards that occurred during the time frame to identify how the policy affected each board. The results of this study will either confirm that promotion boards are either more or less objective concerning race or gender or will document the areas of the promotion process needing improvement.

Figure 1. Promotion Selection Board Timeline



Data from NAVADMIN 186/16 (2016), NAVADMIN 265/18 (2018), and NAVADMIN 247/20 (2020).

D. NAVAL OFFICER PROMOTION PROCESS

This section will provide a broad overview of the Navy Officer promotion board process. The Navy conducts six officer promotion boards each fiscal year. Each rank from O4 to O6 has separate line and staff boards that convene on different days. The promotion process begins with the guiding documents, which signals to the board member and candidates to prepare for the boards. Next, the sections on the board preparation, board convening, record review, and the Tank provides insight into how boards are conducted.

The final section will discuss the order of promotion precedence for those selected to promote.

1. Precepts and Convening Order

The documents that guide the conduct of Navy Promotion Selection Boards are the Precepts that cover all Active Duty and Reserve O6 and below boards and the Convening Orders for each promotion rank O6 and below for line and staff corps officers. Promotion Board Precepts are released each fiscal year to guide the board members from the president to the assistant recorder on their roles, responsibilities, and conduct for all active-duty O4 to O6 boards (PERS-80, 2021). Regarding equal opportunity and diversity, the precept states that board member's evaluation "must be fair and equitable," but avoid preferential treatment to "every race, religion, color, sex (including pregnancy), gender identity, sexual orientation, and national origin" (Secretary of the Navy [SECNAV], 2020).

The notice of convening order is also released annually to announce the promotion selection boards of the FY. This document contains the schedule of all six board convening dates, which starts in January for the Line O6 PSB through May for the Line and Staff O4 Boards. However, the schedule may vary from year to year. Due to COVID-19 precautions, the O5 Staff PSB was moved from March to May, in conjunction with the O4 Staff PSB. Also, the document indicates the officers who are in-zone or junior eligible for promotion in each competitive category for line and staff corps officers. The competitive categories for line and staff corps officers are listed in Table 1.

Table 1. List of Line and Staff Corps Competitive Categories

Line	Staff
Unrestricted Line Officer (11XX/13XX)	Medical Corps (210X)
Special Duty Officer (Human Resources) (120X)	Dental Corps (220X)
Special Duty Officer (Permanent Military Professor) (123X) *O6 Board	Medical Service Corps (230X)
Engineering Duty Officer (14XX)	Judge Advocate Generals Corps (250X)
Aerospace Engineering Duty Officer (Engineering) (151X)	Nurse Corps (290X)
Aerospace Engineering Duty Officer (Maintenance) (152X)	Supply Corps (310X)
Special Duty Officer (Public Affairs) (165X)	Chaplain Corps (410X)
Special Duty Officer (Foreign Area) (17XX)	Civil Engineer Corps (510X)
Special Duty Officer (Oceanography) (180X)	Limited Duty Officer (General Staff) (653X)
Special Duty Officer (Cryptologic Warfare) (181X)	
Special Duty Officer (Information Professional) (182X)	
Special Duty Officer (Intelligence) (183X)	
Special Duty Officer (Cyber Warfare Engineer) (184X)	
Limited Duty Officer (Surface) (61XX)	
Limited Duty Officer (NUC SUB) (62XX)	
Limited Duty Officer (Aviation) (63XX)	
Limited Duty Officer (General Line) (64XX)	

2. Board Preparation

To prepare for the promotion selection board, recorders and assistant recorders arrive one week before the board convenes and verify each eligible officer's record for accuracy and as a courtesy. For example, recorders confirm the records meet the following criteria: that fitness reports (FITREP) are continuous for five years, the performance summary report (PSR) corresponds to the FITREP grades and the promotion recommendations on the official military personnel file (OMPF), and the awards on the officer summary record (OSR) correspond with the OMPF (PERS-80, 2021). However,

officers are responsible for maintaining their own service record prior to the board convening.

3. Board Convening and Record Review

During board week, above-zone (AZ) and in-zone (IZ) records are randomly distributed to the board members for review. Individually, the board member and their recorder then annotate, take notes, and highlight critical information on the OSR/PSR. Then, the notes the recorders annotated on the OSR/PSR will be displayed for all board members to be viewed in the “Tank” (PERS-80, 2021).

4. The Tank

After the individual review of the records, the board members regroup for the selection process in the tank. Each record is displayed across large screens for the entire board to view, and the board member who reviewed the record briefs the record to the board. Officer photos would be visible to the board members on one of those screens during this phase if photos are authorized. As individual briefers present a candidate’s record, the board members vote on the record using confidence factors (100, 75, 50, 25, 0). A confidence factor vote of 100 generally indicates that the board member’s view of the record as an “absolutely must promote,” 75 indicates a “probably promote,” a 50 confidence factor is a “maybe promote,” a 25 score is a “probably not promote,” and a zero is a “do not select.” (M. Bacolod, email to author, January 8, 2022). Once all the AZ and IZ records are briefed and voted, the board is presented with a scattergram of the average scores. The board members then vote and present a motion to cut and “tentatively select” the records that fall above a certain score and/or motions to “not select” records that fall below a certain score. Records with average scores below the threshold for tentative selection, but above the minimum threshold, established for the non-selects enter the “crunch” category. Below-zone (BZ) records are then shown on the screens for the board’s review (without a briefer), and board members vote in the same manner as the prior AZ and IZ records, that is using the same confidence factors. A scatter gram of average scores among the BZ records is then voted on, with a focus on selecting records with high average scores to be included in the crunch category. Sometimes no BZ records are selected at this

stage, while at other boards, several BZ records are selected. The selected BZ records are then pooled with the prior “tentatively select” and “crunch” AZ and IZ records for the board’s review and are voted on for a second time. Board members at this stage are not visibly shown zone designations. As with the prior rounds of voting, board members vote with the confidence factors on each record, and when the average scores are presented on a scattergram, members move to “tentatively select” (and/or “not select”) records above (below) score thresholds. This crunch process is repeated to allow for clear score cutoffs and until the number of selects (supply) equals the number of authorized promotions (demand).

5. Merit Reordering

Starting in the FY20 PSB, the Navy began using the merit reordering process that allows the board to select a limited number of officers to promote to the top of the list. For example, an officer on the bottom of the lineal list would be able to promote on the beginning of the FY, October 1 if selected for merit reordering. After the promotion board selects the officers to promote, the voting process with confidence factors repeats in the same manner to merit reorder the selects.

6. Promotion Precedence

The release of the promotion selection board results indicates those who will promote and their order of precedence. Once the Senate confirms the promotion for O4 and above, selected officers may promote on 01 October, the beginning of the next Fiscal Year (FY). Selected officers promote in a sequence according to the phasing plan that may differ according to grade and competitive category. For example, Human Resources (HR), Aviation Duty Officer [Mechanic] (AMDO), and Supply Corps officers typically promote at a rate of five percent per month for the first eight months of the fiscal year, then fifteen percent per month for the next for months, until the end of the FY. In contrast, all of the other competitive categories promote at three percent per month for the first eleven months of the FY, and the rest promotes in September, the end of the FY. The results of the following promotion board will be released while the previous FY promotion board selectees continue to promote.

Officers who select on a subsequent FY PSB will not promote before an officer selected on a prior PSB. Since the remaining officers promote in September, the end of the FY and the officers of the following PSB start promoting on 1 October. All officers of the prior PSB will promote before any of the officers selected in the next selection board are promoted. For example, suppose one officer selected for O4 in FY21 is on the bottom of the FY21 selection list, and another officer also selected for O4 in FY22 is on top of the FY22 list. The FY21 officer will promote in September, and the FY22 officer will promote in October. Officers promote during their corresponding FY of the board that they were selected, eliminating the possibility of overlapping.

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II. LITERATURE REVIEW

A. ECONOMIC THEORIES OF LABOR MARKET DISCRIMINATION

According to economic literature, the two main sources of labor market discrimination that lead to disparities among women and minorities are taste-based discrimination and statistical discrimination. Lang and Spitzer (2020) define taste base discrimination as a reflection of a person's prejudice or preference toward a specific group of people and their perceived expectation of that group's productivity level. Ehrenberg and Smith (2018) characterize taste-based discrimination as a personal-prejudice model where firms based their decision making on the opportunity costs of hiring minorities or women. Furthermore, Ehrenberg and Smith categorize taste-based discrimination according to the canonical Becker Model of Discrimination, where discrimination is derived from the employer, employee, or customer (Lang & Spitzer, 2020, p.69). For example, a firm may prefer to hire white males because the employer perceives a minority race to be lazy and less productive, an employee prefers to work with people of their same race, while customers prefer to be served by white males. In this model, because of employer/employee/customer distaste for minority groups, labor demand for white workers is greater compared to minorities and females; therefore, the wage for white males will be larger. As a result, discriminator firms pay higher wages for preferred workers at a profit loss.

While taste-based discrimination is personal inference, statistical discrimination, on the other hand, is "based on valid statistical inference" in a labor market with incomplete information (Lang & Spitzer, 2020, p. 69). Since employers are unaware of their potential employees' productivity level during the hiring process, they may base the productivity and ultimately hiring decisions on valid statical data on the candidates' demographics. Regardless of the theoretical source, taste-based and statistical discrimination are still forms of discrimination.

Empirical, economic researchers use audit and correlation studies to determine whether firms engage in discrimination during their hiring process. Audit studies reviewed in Lang and Spitzer (2020) employ black and white actors with similar resumes to sit on

job interviews for research to study the hiring decision based on the employer's perception of the actors. However, different actors make the ability to maintain the *ceteris paribus* assumption difficult. A black and white actor may differ only in appearance, Kang and Spitzer argues that the actors will not match their actions identically and the employer will pick up on signals other than race. To control for differences in actors, researchers also use correspondence studies to examine the probability of discrimination outcomes. In these studies, fictitious resumes that only differ by the information that signals race were sent to firms to determine hiring outcomes according to Kang and Spitzer. By eliminating the human factor, researchers are able to control what the employers perceive. Well known audit and correspondence studies by Goldin and Rouse (2000) and Bertrand and Mullainathan (2004) will be discussed later in the chapter.

In the current study, masking the photos on the PSBs is similar to a correspondence study because the board only sees the candidates' names and military record information. This study observes one policy change in that photos go from not visible to visible and not visible to visible in the second change. If promotion outcomes change when photos are not visible compared to when photos are visible, results may indicate occurrences of discrimination. The underlying type of discrimination could either be taste-based or statistical discrimination, but that will be difficult to disentangle as the deliberation of selection boards is not publicized.

B. DIVERSITY AND INCLUSION IN THE CIVILIAN LABOR MARKET

Unlike military studies, civilian studies examine the wage gap as an indicator for discrimination in the labor market. The typical finding is that minorities and females make less than white males. The literature also finds that minorities and women face discrimination in hiring, evaluating, and promoting.

A well-known study by Bertrand and Mullainathan (2004) examines how the race of job candidates affects the probability of callbacks by sending fictitious resumes to different firms. The resumes were similar, but the names were changed to manipulate perceived race. Bertrand and Mullainathan find that African American-sounding names receive fewer callbacks than White-sounding names, indicating that firms have implicit

biases when they inferred race with names. Their study corresponds with the current research in which the names of the officers will be visible while the photos will be obscured to the promotion board. However, the study differs because Bertrand and Mullainathan focus on the hiring process while the current study analyzes promotions of Naval officers.

In a study regarding gender and hiring auditions, Goldin and Rouse (2000) analyze the orchestra hiring outcomes based on blind auditions. During their study, orchestra players played behind a screen and any information that could potentially identify the gender of the player, such as names or the sound their shoe makes when walking to the stage, obscured for the board conducting the audition. They conclude that where players played behind a screen, and their names were hidden, increased the probability of females hired into the orchestra. The increase in the number of hired females with the audition change indicates that implicit bias existed during the hiring process, which is similar to Bertrand and Mullainathan's conclusion. The blind audition concept parallels the current study because removing the photos is similar to using a screen. Instead of being evaluated for their musical performance, the performance of naval officers is assessed by their service performance indicated on their service record. The current study contributes to Goldin and Rouse's study by including race. Additionally, Goldin and Rouse made a valid point by stating that the best solution was open auditions where the board could see the performer to ensure that females are hired, when the purpose of the audition is to increase the number of females in the orchestra. Their claim mirrors the Chief of Naval Personnel's statement that removing photos hurt diversity in the Navy (2021). However, explicit gender selection enters the realm of Affirmative Action.

Bellemore's (2001) study uses promotion in baseball to analyze discrimination in the labor market. Sports provides the pool of promotion candidates to determine the degree of bias in the selection process. He concludes that Black and Hispanic players are less likely to be promoted to the major leagues than whites. In contrast, the extent of discrimination is decreased when the league expands to other regions. This corresponds to the theory that the more positions are available, the baseball league becomes less discriminating to fill the open positions. The finding also corresponds to the pay gap under employer discrimination model where the baseball league is nondiscriminatory toward Black and Hispanic players,

more minority player will be hired and eliminates the need for wage differential (Ehrenberg and Smith, 2018).

During the drawdown in the 1990s, the military experienced similar results for minority officers but fewer positions. In Darrow's (1995) NPS thesis, he concludes that the number of White officers decrease while the number of minority officers increase during the military drawdown. However, Black and Hispanic officers' promotion rates were lower than White officers during the drawdown.

Finally, discrimination in the labor market is not isolated to the United States. For example, Pudney and Shields (2000) analyze the promotion process of nurses in Britain's National Health Services to determine the extent of labor market discrimination against minorities and females. They find that despite nursing being a female-dominated profession, White males have the advantage of promoting quicker than minorities and females.

C. DIVERSITY AND INCLUSION IN THE MILITARY

Hosek et al. (2001) conducts quantitative and qualitative study to examine the promotion and retention of minority officers. Quantitatively, they analyze the official records of seven cohorts of officers who commissioned between 1967 and 1991. Qualitatively, in 1995, they interview "personnel managers and policy implementers" from each service headquarters and a group of mid-level officers from each service and find that their results differ when studying the patterns of promotion and retention separately. For example, blacks are 29 percent more likely to fail to select for promotion than their white male counterparts but are 20 percent more likely to remain in the military for the next promotion cycle. However, when the promotion and retention rates are combined, Hosek et al. find that the promotion to O4 for white and black males are similar at 37 percent and 36 percent, respectively. A possible explanation for the difference is the military's up-or-out system. Officers who fail to promote twice are forced to leave the services. As officers separate from the military, the number of eligible officers for promotion becomes smaller. Since black officers are more likely to remain in the military than white officers, the pool

of black officers appears larger giving the impression that “white and black officers are promoted at the same rate” (Burk and Espinosa, 2012).

Regarding gender, Hosek et al. (2001) find that white female officers equally promote at the same rate as white males but are more likely to leave before their next promotion cycle. On the other hand, black females are “least likely to promote at all stages” but more likely to stay until the next promotion.

As previously mentioned, Economic researchers use audit and correlation studies to determine whether firms engage in discrimination during the hiring process. The interview findings explain the promotion and retention disparities. For example, they find that minorities and females believe that they have difficulties building a competitive record of performance for promotion. Minorities believe that they lack the mentorship of senior leaders. Also, they are placed in teaching or recruiting duties to recruit more minorities instead of placing in operational tours. According to the DOD Board of Diversity and Inclusion (DODBDI) (2020) findings, minorities placed in these tours cannot take on traditional operational tours and become less competitive for promotion. Comparably, White males who are less likely to be placed in recruiting duty to increase minority recruitment are more likely to receive competitive FITREPS because they can fill operational tours. The DODBDI’s recommendation is to increase transparency with senior leadership when selecting minorities and women for these atypical tours.

Additionally, women leave due to family plans or lack of combat-operation opportunities. An updated study by Asch, Miller, and Malchiodi (2012) added that minority males who promote to O4 would be less likely to promote to O6. When they analyze the effects of partially restricted occupations for women are unavailable for the previous study, Asch, Miller, and Malchiodi find that the newly opened occupations do not affect their promotion rate to O6.

Burk and Espinosa (2012) analyze several military studies to determine whether racial disparities in the military causes are institutional or personnel choices. Their analysis of officer promotion boards found that fitness reports (FITREP) recommendations differ between black officers and minority officers. For example, white officers receive an early

promotion descriptor in their FITREP compared to black who receive “on time” or no promotion recommendation on their FITREP. This difference in evaluation verbiage signals a stark contrast between a high performer and average performer, contributing to racial disparities in officer promotions. In addition, the fact that minorities are being selected for atypical recruiting and teaching tours to bolster minority recruitment may account for the less competitive FITREPS. These studies provide a broad overview of discrimination in military promotion.

The following studies provide a narrow view of racial and ethnic underrepresentation of senior officer ranks with the U.S. Marine Corps and U.S. Army. Salas (2015) analyzed the promotion and retention factors between Hispanic and non-Hispanic Marines in a Naval Postgraduate School thesis. Salas find that Hispanic officers have a higher retention rate than non-Hispanics, and Hispanics are equally promotable to O4 compared to non-Hispanics. Furthermore, Salas adds that Hispanics who graduate from top universities are less likely to promote due to “better employment opportunities outside the military” (2015, p. 87). The explanation may apply to previous studies stating that blacks have a higher retention rate because whites leave the military for better civilian opportunities.

In analyzing the use of photographs in Army promotion boards, Bigler (2000) find the same trends regarding the underrepresentation of minorities in the senior officer ranks. Bigler argues that board members experience impression formation theory and primacy effect. For example, board members form an impression on the officer’s photo and obtain information to validate their initial impression as a “categorical confirmation” (2001, p. 15). If the information is inconsistent with their initial impressions, they find an alternative category for the individual. According to Bigler, primacy occurs when the board sees the photo and forms an opinion of the officer before reviewing the officers’ record. A potentially negative impression by viewing the photo first may be carried throughout the evaluation process and affect the final decision. As a result, Bigler’s solution to avoid biased outcomes of Army promotions from viewing photos is to allow the images to be viewed at the end of the evaluation.

D. SUMMARY

Although civilian studies regarding diversity and inclusion of employees do not directly translate to military studies of the same topic, some similarities can be derived from the reasons why disparities of minorities and women occur. The similarities covered in the literature review include the disparities with performance evaluations and potential implicit bias in the board selection process.

One potential gap identified in the reading is that the military's own effort to increase diversity and inclusion may be harming the careers of the current minority officers. Placing minorities in tours that would increase prospective minorities from joining the military has the potential to inhibit career progression. As minorities are assigned to these recruiting tours, they are unable able to be assigned to operational tours; therefore, reducing their ability to generate a competitive record for promotion.

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III. DATA

A. DATA OVERVIEW

The chapter describes the two data sets obtained for the study. An extensive variable set is required for the study to match the in-zone officers with their exact promotion boards. First, the board member data is a compilation of 35 rosters found in MyNavyHR and condenses 1355 promotion board members into one list. The board member data also contains the race, ethnicity, and gender of each board member along with the board designation. Next, the officer data is obtained from Defense Manpower Data Center (DMDC). The officer designation and board designation are used to match the in-zone officer with their respective board. Race and ethnicity information is condensed to the OMB (2007) standards. Since zone information is not included with DMDC data the chapter ends with a description of the zone calculation.

B. BOARD MEMBER DATA

A list of active-duty Naval Line and Staff Corps Officer O4-O6 board members is derived from published rosters of PSBs from FY2017 to FY2022. The rosters contain the names, ranks, and designation of all members of the promotion selection boards. Each rank has a separate line board and a staff corps, equaling six officer boards per year. The roster delineates the board by line or staff corps designation, as seen in Table 1. Unfortunately, the FY17 O6 Line Board was unavailable for the study.

The format of the roster varies from year to year. For example, the FY18 Board Membership rosters were in a list format, while FY17, FY19, FY20, FY21, and FY22 were in table format. Another difference among the rosters is the inconsistent breakdown of the Limited Duty Officer (LDO) boards. Although 6XXX is the LDO designation, some rosters separate the designation into its four communities. For example, FY21 and FY22 are broken down as 61XX (Surface), 62XX (Nuclear Submarines), 63XX (Aviation), and 64XX (General Line). To alleviate the effects of this inconsistency, the current study will evaluate the LDO community as one combined LDO (6XXX) subspecialty, analogous to the FY19 Line PSBs.

The final inconsistency with the rosters is the alternates list for the FY21 Line O4 Board, which is most likely a COVID-19 health contingency plan. The roster does not indicate whether the alternates participated in the boards. As a result of the additional alternate board members, a substantial increase in board members is apparent when comparing the FY19 and FY20 Line PSBs. Therefore, these board members are included in the analysis.

Naval Register website, located on BUPERS Online, is used to validate the information of the board members. The Navy Register is a database that contains all active duty, reserve, and retired Naval officers. The data from the registry that is used for the analysis include the officer's name, gender, current rank, date of rank, and designator.

The information of the board members, including names with rank, gender, and calendar year of the board is compiled on a single document and sent to DMDC. The roster information is then merged with the individual race and ethnicity of each board member. DMDC matches each officer from the list with one of ten races and seventeen ethnicities. For the current study, race and ethnicity information is consolidated and standardized into a single race and ethnic combination according to the Office of Management and Budget [OMB] (2007). The five categories are American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; Hispanic; and White, not of Hispanic origin. Furthermore, OMB defines ethnicity as two categories: Hispanic origin or not of Hispanic origin. For the study, Hispanic will be considered a race.

Unlike OMB, DMDC utilizes country of origin to define ethnicity. To standardize race and ethnicity for the study, the board members are identified according to their race first, then their ethnicity. For example, if a member identifies their race as Black or African American or White, with none other, or unknown as their ethnicity, they are identified as Black or African American or White for the study. Some officers who identify as Asians, Native Hawaiian, or other Pacific Islanders also identifies their ethnicity on the DMDC list. For example, officers who identify their race as Asians or Pacific Islanders also list their ethnicity as Asian descent, such as Asian Indian, Chinese, Filipino, Japanese, Korean, or other Asian descent. For the study, they are labeled as Asians, and Asians and Pacific Islanders are combined into an Asian Pacific Islander category. Furthermore, those who

list Mexican, Puerto Rican, Cuban, Latin America with Hispanic descent or other Hispanic descent are identified as “Hispanic” for the study. From this information, we are able to determine which board members participated in each specific PSB and determine the ethnic and gender composition of the board. The following standard race and ethnicities are used for the study American Indian or Alaskan Native, Asian Pacific Islander, Black, Hispanic, and White. Mixed race and unknown race are included in the study to capture the individuals who dissociate themselves with one race.

Regarding gender, the race categories include both males and females. The female dummy variable generated for the table indicates the percentage of females of the entire competitive category.

Merging the race and ethnicity data from DMDC with the PBS rosters matches the board member with their board. Indicator variables for FY, rank of board, and competitive category of the board are created to indicate which PSB the board members participated in. Also, race and gender indicator variables are generated from the DMDC data. The statistics show the board member ethnic and gender composition of each lieutenant commander to captain PSBs. The tables are broken down by line and staff competitive categories and shows the percentage of each race of the board members.

Tables 2 through 13 provide the race, ethnic and gender composition of each PSB for each rank of the FY19 and FY20 line and staff PSB. FY19 and FY20 PSB are selected for the study due to the policy change according to NAVADMIN 265/18 that reinstated the photos in the selection boards. Specifically, PSB in FY19, the photos are not visible, whereas in FY20, the photos were visible.

The tables are broken down by FY and line or staff communities. Each table is then further divided by line and staff designators. Specifically, Tables 2 through 4 are FY19 lieutenant commander, commander, and captain line boards and Tables 5 through 7 are FY20 line boards of the same rank. Similarly, Tables 8 through 10 are FY19 lieutenant commander, commander, and captain staff boards and Tables 11 through 13 are FY20 staff boards of the same rank. The statistics show the race and gender composition of each board

by designator. The data is consistent with the 2020 military demographics as Whites being the predominant race within the military and the Navy.

Table 2. FY19 LCDR LINE PSB Board Members' Race and Gender Composition by Competitive Category

FY19 LCDR LINE	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N =
URL 11XX	0.000	0.000	0.053	0.000	0.947	0.000	0.053	19
HR 120X	0.000	0.143	0.143	0.000	0.748	0.015	0.198	7
EDO 14XX	0.000	0.000	0.143	0.000	0.857	0.000	0.143	7
AEDO 151X	0.000	0.143	0.000	0.000	0.857	0.000	0.143	7
AMDO 152X	0.000	0.000	0.286	0.000	0.714	0.000	0.143	7
PAO 165X	0.000	0.000	0.000	0.143	0.857	0.000	0.143	7
FAO 17XX	0.000	0.143	0.143	0.000	0.714	0.000	0.143	7
OCEANO 180X	0.000	0.000	0.111	0.000	0.889	0.000	0.111	9
CW 181X	0.000	0.000	0.111	0.111	0.778	0.000	0.222	9
IP 182X	0.000	0.000	0.286	0.000	0.748	0.000	0.143	7
INT 183X	0.000	0.000	0.125	0.000	0.875	0.000	0.250	8
LDO 6XXX	0.000	0.091	0.000	0.000	0.909	0.000	0.182	11

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 3. FY19 CDR LINE PSB Board Members' Race and Gender Composition by Competitive Category

FY19 CDR LINE	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N =
URL 11XX	0.000	0.059	0.118	0.000	0.824	0.000	0.118	17
HR 120X	0.000	0.000	0.333	0.000	0.667	0.000	0.333	9
EDO 14XX	0.000	0.000	0.250	0.000	0.750	0.000	0.250	8
AEDO 151X	0.000	0.000	0.222	0.000	0.778	0.000	0.222	7
AMDO 152X	0.000	0.111	0.222	0.000	0.667	0.000	0.222	9
PAO 165X	0.000	0.000	0.333	0.000	0.667	0.000	0.333	9
FAO 17XX	0.000	0.000	0.222	0.111	0.667	0.000	0.333	9
OCEANO 180X	0.000	0.000	0.222	0.111	0.667	0.000	0.222	9
CW 181X	0.000	0.125	0.000	0.000	0.875	0.000	0.250	8
IP 182X	0.000	0.000	0.222	0.000	0.778	0.000	0.222	9
INT 183X	0.000	0.000	0.111	0.000	0.889	0.000	0.111	9
LDO 6XXX	0.000	0.091	0.000	0.000	0.909	0.000	0.182	11

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 4. FY19 CAPT LINE PSB Board Members' Race and Gender Composition by Competitive Category

FY19 CAPT LINE	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N =
URL 11XX	0.067	0.000	0.000	0.067	0.867	0.000	0.133	15
HR 120X	0.143	0.000	0.000	0.143	0.714	0.000	0.286	7
EDO 14XX	0.143	0.000	0.000	0.143	0.714	0.000	0.143	7
AEDO 151X	0.143	0.000	0.000	0.143	0.714	0.000	0.143	7
AMDO 152X	0.143	0.000	0.000	0.286	0.571	0.000	0.125	7
PAO 165X	0.167	0.000	0.000	0.167	0.667	0.000	0.167	6
FAO 17XX	0.143	0.143	0.000	0.143	0.571	0.000	0.143	7
OCEANO 180X	0.143	0.000	0.000	0.143	0.714	0.000	0.143	7
CW 181X	0.143	0.000	0.000	0.143	0.714	0.000	0.143	9
IP 182X	0.143	0.000	0.000	0.143	0.714	0.000	0.286	7
INT 183X	0.111	0.000	0.000	0.111	0.667	0.111	0.111	9
LDO 6XXX	0.091	0.000	0.000	0.091	0.727	0.091	0.091	11

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 5. FY20 LCDR LINE PSB Board Members' Race and Gender Composition by Competitive Category

FY20 LCDR LINE	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N =
URL 11XX	0.000	0.000	0.100	0.100	0.800	0.000	0.050	20
HR 120X	0.000	0.000	0.111	0.000	0.889	0.000	0.111	9
EDO 14XX	0.000	0.000	0.167	0.000	0.833	0.000	0.167	6
AEDO 151X	0.000	0.000	0.111	0.000	0.778	0.111	0.111	9
AMDO 152X	0.000	0.000	0.111	0.000	0.889	0.000	0.111	9
PAO 165X	0.000	0.000	0.111	0.000	0.889	0.000	0.111	9
FAO 17XX	0.000	0.000	0.111	0.000	0.889	0.000	0.222	9
OCEANO 180X	0.000	0.000	0.111	0.000	0.889	0.000	0.111	9
CW 181X	0.000	0.000	0.111	0.111	0.778	0.000	0.222	9
IP 182X	0.000	0.000	0.111	0.000	0.889	0.000	0.111	9
INT 183X	0.000	0.111	0.111	0.000	0.778	0.000	0.111	9
LDO 6XXX	0.077	0.000	0.154	0.000	0.769	0.000	0.154	13

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 6. FY20 CDR LINE PSB Board Members' Race and Gender by Competitive Category

FY20 CDR LINE	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N =
URL 11XX	0.067	0.067	0.133	0.000	0.733	0.000	0.000	15
HR 120X	0.000	0.125	0.125	0.125	0.625	0.000	0.250	8
EDO 14XX	0.000	0.286	0.000	0.000	0.714	0.000	0.286	7
AEDO 151X	0.000	0.143	0.000	0.000	0.857	0.000	0.143	7
AMDO 152X	0.143	0.143	0.000	0.143	0.871	0.000	0.143	7
PAO 165X	0.000	0.167	0.000	0.000	0.833	0.000	0.167	6
FAO 17XX	0.000	0.143	0.000	0.000	0.857	0.000	0.286	7
OCEANO 180X	0.000	0.125	0.000	0.000	0.875	0.000	0.250	8
CW 181X	0.000	0.125	0.000	0.000	0.875	0.000	0.250	8
IP 182X	0.000	0.143	0.000	0.000	0.857	0.000	0.286	7
INT 183X	0.000	0.125	0.000	0.000	0.875	0.000	0.125	8
LDO 6XXX	0.000	0.091	0.000	0.000	0.909	0.000	0.182	11

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 7. FY20 CAPT LINE PSB Board Members' Race and Gender Composition by Competitive Category

FY20 CAPT LINE	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N =
URL 11XX	0.000	0.000	0.067	0.000	0.933	0.000	0.067	15
HR 120X	0.000	0.111	0.000	0.000	0.778	0.111	0.222	9
EDO 14XX	0.000	0.111	0.000	0.000	0.778	0.111	0.111	9
AEDO 151X	0.000	0.125	0.000	0.000	0.750	0.125	0.125	8
AMDO 152X	0.000	0.222	0.000	0.000	0.666	0.111	0.111	9
PAO 165X	0.000	0.111	0.111	0.000	0.667	0.111	0.222	9
FAO 17XX	0.000	0.111	0.000	0.000	0.778	0.111	0.111	9
OCEANO 180X	0.000	0.111	0.000	0.000	0.778	0.111	0.111	9
CW 181X	0.000	0.111	0.000	0.000	0.778	0.111	0.222	9
IP 182X	0.000	0.125	0.000	0.000	0.750	0.125	0.250	8
INT 183X	0.000	0.111	0.000	0.111	0.667	0.111	0.111	9
LDO 6XXX	0.000	0.071	0.000	0.071	0.786	0.071	0.071	14

Adapted from DMDC data. FY20 O6 Line boards includes two additional members for each board. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 8. FY19 LCDR STAFF PSB Members' Race and Gender Composition by Competitive Category

FY19 LCDR STAFF	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N=
MC 21XX	0.000	0.000	0.143	0.000	0.857	0.000	0.143	7
DC 22XX	0.000	0.200	0.200	0.000	0.600	0.000	0.400	5
MSC 23XX	0.000	0.400	0.200	0.000	0.400	0.000	0.400	5
JAG 25XX	0.000	0.200	0.000	0.200	0.600	0.000	0.200	5
NC 29XX	0.000	0.200	0.200	0.000	0.400	0.200	0.600	5
SC 31XX	0.000	0.000	0.200	0.000	0.800	0.000	0.400	5
CHC 41XX	0.000	0.143	0.000	0.000	0.715	0.143	0.143	7
CEC 51XX	0.000	0.200	0.000	0.000	0.800	0.000	0.200	5

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 9. FY19 CDR STAFF PSB Members' Race and Gender Composition by Competitive Category

FY19 CDR STAFF	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N=
MC 21XX	0.000	0.000	0.000	0.143	0.857	0.000	0.286	7
DC 22XX	0.000	0.200	0.000	0.000	0.600	0.200	0.600	5
MSC 23XX	0.000	0.000	0.000	0.200	0.600	0.200	0.200	5
JAG 25XX	0.000	0.000	0.000	0.200	0.800	0.000	0.200	5
NC 29XX	0.000	0.000	0.200	0.000	0.800	0.000	0.400	5
SC 31XX	0.000	0.000	0.200	0.200	0.600	0.000	0.200	5
CHC 41XX	0.143	0.000	0.000	0.000	0.875	0.000	0.000	7
CEC 51XX	0.000	0.200	0.000	0.400	0.400	0.000	0.200	5

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 10. FY19 CAPT STAFF PSB Members' Race and Gender Composition by Competitive Category

FY19 CAPT STAFF	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N=
MC 21XX	0.000	0.000	0.143	0.000	0.714	0.143	0.286	7
DC 22XX	0.000	0.000	0.200	0.200	0.600	0.000	0.400	5
MSC 23XX	0.000	0.000	0.000	0.200	0.800	0.000	0.200	5
JAG 25XX	0.000	0.000	0.000	0.000	1.000	0.000	0.286	7
NC 29XX	0.000	0.200	0.000	0.000	0.800	0.000	0.400	5
SC 31XX	0.000	0.000	0.200	0.200	0.600	0.000	0.200	5
CHC 41XX	0.000	0.000	0.286	0.000	0.714	0.000	0.286	7
CEC 51XX	0.000	0.000	0.000	0.143	0.857	0.000	0.143	7

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 11. FY20 LCDR STAFF PSB Members' Race and Gender Composition by Competitive Category

FY20 LCDR STAFF	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N=
MC 21XX	0.000	0.125	0.250	0.000	0.625	0.000	0.375	8
DC 22XX	0.000	0.000	0.167	0.000	0.833	0.000	0.333	6
MSC 23XX	0.125	0.000	0.125	0.000	0.750	0.000	0.500	8
JAG 25XX	0.000	0.000	0.200	0.000	0.800	0.000	0.200	5
NC 29XX	0.000	0.000	0.333	0.000	0.667	0.000	0.167	6
SC 31XX	0.000	0.000	0.200	0.000	0.800	0.000	0.200	5
CHC 41XX	0.000	0.000	0.143	0.071	0.714	0.000	0.143	7
CEC 51XX	0.000	0.000	0.000	0.400	0.600	0.000	0.200	5

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 12. FY20 CDR STAFF PSB Members' Race and Gender Composition by Competitive Category

FY20 CDR STAFF	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N=
MC 21XX	0.000	0.000	0.111	0.000	0.889	0.000	0.333	9
DC 22XX	0.000	0.200	0.000	0.000	0.800	0.000	0.400	5
MSC 23XX	0.143	0.000	0.143	0.000	0.714	0.000	0.429	7
JAG 25XX	0.250	0.000	0.000	0.000	0.750	0.000	0.250	4
NC 29XX	0.000	0.000	0.000	0.200	0.600	0.200	0.400	5
SC 31XX	0.000	0.000	0.200	0.000	0.500	0.000	0.200	5
CHC 41XX	0.167	0.000	0.000	0.000	0.833	0.000	0.333	6
CEC 51XX	0.000	0.000	0.200	0.000	0.600	0.200	0.200	5

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

Table 13. FY20 CAPT STAFF PSB Members' Race and Gender Composition by Competitive Category

FY20 CAPT STAFF	American Indian Alaskan Native	Asian Pacific Islander	Black	Hispanic	White	Unknown	Female	N=
MC 21XX	0.000	0.000	0.125	0.000	0.857	0.000	0.143	7
DC 22XX	0.200	0.200	0.000	0.000	0.600	0.000	0.200	5
MSC 23XX	0.000	0.000	0.000	0.200	0.800	0.000	0.400	5
JAG 25XX	0.000	0.167	0.000	0.000	0.833	0.000	0.500	6
NC 29XX	0.000	0.250	0.000	0.000	0.750	0.000	0.250	4
SC 31XX	0.000	0.000	0.250	0.000	0.750	0.000	0.250	4
CHC 41XX	0.000	0.143	0.000	0.143	0.714	0.000	0.143	7
CEC 51XX	0.000	0.143	0.143	0.000	0.714	0.000	0.286	7

Adapted from DMDC data. Race categories includes men and women. Female category indicates females across the entire observation group.

C. DMDC DATA

The current study uses monthly observation of all naval officers from September 2016 through September 2021, obtained from DMDC. The time frame of interest captures the policy change in 2018 where photos are not visible in the FY19 boards, but visible in the FY20 boards.

The DMDC data lacks a specific indicator variable for promotion. A promotion indicator that identifies when an officer is promoted to the next rank or which PSB the officer is selected from is also absent from the data. A promotion variable is, therefore, generated from the time in rank that indicates the duration of months at a certain rank and date of rank that indicates the promotion date. The promotion data is also vital to determine the PSB that selected the individual for the next paygrade. Identifying the specific PSB that selected the officer provides an indicator to simply match the race and gender composition of a board with each officer eligible for promotion.

The DMDC data also contained ethnic, racial, and gender information for the officers. Similar to the board member data, DMDC used the same race and ethnic

identifiers. Race and ethnic data of the officers are standardized in the same manner as the board members. Race dummy variables are created for each race group.

Additionally, the data contains the officer designator. Since the PSBs are separated into competitive categories according to the designator, dummy variables are created for each designator to match the officer with their competitive category board. The designator and FY information are used to pinpoint the PSB that board members were assigned to.

Finally, the race and gender composition of the board member for each individual PSB is combined with the officer information in DMDC data set. Table 14 provides an overview of the variables generated from the DMDC data, and Table 15 is an overview of the designator dummy variables.

Table 16 shows the summary statistics of all naval officers in the study who promoted during FY19 and FY20 by rank from the DMDC data. More importantly, the race demographics are consistent with the 2020 military demographic data.

Table 14. Overview of Variables Generated from DMDC Data

Variable	Description
Zone Status	
O3inzone	= 1 if in-zone for LCDR PSB, = 0 otherwise
O4inzone	= 1 if in-zone for CDR PSB, = 0 otherwise
O5inzone	= 1 if in-zone for CAPT PSB, = 0 otherwise
Promotion Status	
PromotedToLCDR	= 1 if promoted to LCDR, = 0 otherwise
PromotedToCDR	= 1 if promoted to CDR, = 0 otherwise
PromotedToCAPT	= 1 if promoted to CAPT, = 0 otherwise
Promotion Board	
FYXXLineO6 (XX = 19 to 20)	= 1 if in-zone for FYXX CAPT Line PSB, = 0 Otherwise
FYXXStaffO6	= 1 if in-zone for FYXX CAPT Staff PSB, = 0 Otherwise
FYXXLineO5	= 1 if in-zone for FYXX CDR Line PSB, = 0 Otherwise
FYXXStaffO5	= 1 if in-zone for FYXX CDR Staff PSB, = 0 Otherwise
FYXXLineO4	= 1 if in-zone for FYXX LCDR Line PSB, = 0 Otherwise
FYXXStaffO4	= 1 if in-zone for FYXX LCDR Staff PSB, = 0 Otherwise
Race	
American Indian	= 1 if American Indian or Alaskan Native, = 0 otherwise
Asian	= 1 if Asian or Pacific Islander, = 0 otherwise
Black	= 1 if Black, not of Hispanic origin, = 0 otherwise
Hispanic	= 1 if Hispanic, = 0 otherwise
White	= 1 if White, = 0 otherwise
Policy Change	
PhotosNotVisible	= 1 if photos were not visible to the board, 0 = otherwise
PhotosVisible	= 1 if photos were visible to the board, 0 = otherwise

Table 15. Overview of Designator Variables

Variable	Description
Line	
UnrestrictedLine	= 1 if designator is 11XX/13XX, = 0 otherwise
HumanResources	= 1 if designator is 120X, = 0 otherwise
PermanentMilitaryProfessor	= 1 if designator is 123X, = 0 otherwise
EngineeringDutyOfficer	= 1 if designator is 14XX, = 0 otherwise
AEDOEngineering	= 1 if designator is 151X, = 0 otherwise
AEDOMaintenance	= 1 if designator is 152X, = 0 otherwise
PublicAffairs	= 1 if designator is 165X, = 0 otherwise
FAO	= 1 if designator is 17XX, = 0 otherwise
Oceanography	= 1 if designator is 180X, = 0 otherwise
Cryptologic Warfare	= 1 if designator is 181X, = 0 otherwise
Information Professional	= 1 if designator is 182X, = 0 otherwise
Intelligence	= 1 if designator is 183X, = 0 otherwise
Cyber Warfare Engineer	= 1 if designator is 184X, = 0 otherwise
LDOSurface	= 1 if designator is 61XX, = 0 otherwise
LDONuc	= 1 if designator is 62XX, = 0 otherwise
LDOAviation	= 1 if designator is 63XX, = 0 otherwise
LDOGeneralLine	= 1 if designator is 64XX, = 0 otherwise
Staff	
MedicalCorps	= 1 if designator is 210X, = 0 otherwise
DentalCorps	= 1 if designator is 220X, = 0 otherwise
MedicalServiceCorps	= 1 if designator is 230X, = 0 otherwise
JAG	= 1 if designator is 250X, = 0 otherwise
NurseCorps	= 1 if designator is 290X, = 0 otherwise
SupplyCorps	= 1 if designator is 310X, = 0 otherwise
ChaplainCorps	= 1 if designator is 410X, = 0 otherwise
CivilEngineerCorps	= 1 if designator is 510X, = 0 otherwise
LDOGeneralStaff	= 1 if designator is 653X, = 0 otherwise

Table 16. Overall Promotion Summary Statistics

Demographics	LCDR	CDR	CAPT
American Indian Alaskan Native	0.007	0.003	0.004
Asian Pacific Islander	0.071	0.052	0.060
Black	0.107	0.089	0.078
Hispanic	0.090	0.073	0.073
White	0.732	0.778	0.778
Multi-race	0.041	0.028	0.020
Unknown race	0.021	0.027	0.027
Female	0.233	0.202	0.167
Married with spouse	0.064	0.046	0.040
Married with children	0.154	0.170	0.155
Accession Source			
Naval Academy	0.084	0.133	0.143
OCS	0.206	0.136	0.219
NROTC	0.104	0.157	0.139
Direct Commissioning	0.187	0.271	0.230
Education			
Bachelor's	0.353	0.158	0.062
Master's	0.334	0.516	0.664
Post Master's	0.003	0.007	0.002
Doctorate	0.115	0.201	0.230
Professional development			
JPME Initial	0.007	0.012	0.047
JPME Advanced	0.003	0.005	0.009
SWO	0.216	0.207	0.171
FMFQO	0.029	0.023	0.010
ASW	0.000	0.000	0.000
IWC	0.000	0.002	0.001
Nuclear trained	0.036	0.068	0.043
Executive Medicine	0.020	0.029	0.052
Policy Change			
No Photos	0.364	0.437	0.423
With Photos	0.636	0.563	0.577
N =	2591	1452	1290

Adapted from DMDC (2022).

D. ZONE DETERMINATION

Zone status for the officers is unavailable in the DMDC data, which would have provided a more precise analysis. Without zone status information, all officers of a certain rank will incorrectly be considered for promotion in the study. For example, in the FY21 O4 promotion selection boards, the only lieutenants that meet the time in rank requirements

are eligible for the promotion. Therefore, without promotion zones, all the lieutenants in the observations are analyzed for promotion to LCDR in the FY21 O4 promotion selection boards, which will inflate the results. Zone status information narrows the pool of LTs with only the eligible candidates.

In this study, only the officers eligible to promote per FY, designation, and rank are of interest. Since a small percentage of officers are selected above zone, and even smaller rates are selected below-zone, this study focuses on the eligible officers to promote for each rank. The zones for this study are calculated by utilizing two factors regarding the promotion process: (1) time in grade and (2) whether the officer is promoted at the beginning or the end of the promotion cycle.

The time in grade variable of when the PSB convenes is used to determine when an officer is in-zone for promotion. The fact that officers promote every FY starting on October 1 through September of the following year, indicates that the officer who promote during the current FY was selected for promotion in the previous FY. With this information, specific PSB variables are generated indicating the FY, rank, and competitive category of the board.

Once officers select for promotion for a given FY, the Senate must confirm their selection. Once confirmed, officers promote in order of precedence at the start of the new FY, from October 1 of the current year to September of the following year. Officers that are on the top of the list are promoted first. Based on performance, the board could select up to 15 percent of the candidates to merit-reorder to the top of the list (SECNAV, 2021). Conversely, the officers on the bottom of the list are most likely less senior in the rank category and, therefore, the bottom of the in-zone list or selected below-zone.

To determine the upper bound of the calculated in-zone range for the study, first, those promoted on October 1 are identified for rank. Next, the file date variable is back tracked to the date that the PSB convened for a given rank. This date is then compared with the time in grade variable. The time in grade in months on the date that the board convenes is used to calculate the upper bound of the zone. However, for the zone calculation in the

study, all O6 boards occur in January, O5 board occur in March, and O4 boards occur in May.

The lower bound of the study's in-zone category is determined by those promote at the end of the FY, which is September of the following year. Once an officer of the same designator as the upper bound officer is identified to promote in September, the file date is back tracked to the date that the PSB convened. The file date is then compared with the time in grade in months variable, indicating the lower bound time in grade. Finally, the process to obtain the upper and lower bounds for the calculated zone is repeated for the O5 and O4 selection boards.

The upper and lower bound limits per rank provided the study's in-zone category. However, this method has limitations and potential for introducing calculation errors. First, the calculation is completed for the Unrestricted Line (11XX) community only. Each community may differ in its selection rate for each rank. Another limitation is that the calculation is an estimate of the in-zone category. Without actual zone status information, determining which officers were in-zone for promotion may contribute to the errors in the calculation. To reduce the likelihood of capturing an above-zone or below-zone select in the analysis, range is narrowed by subtracting six months from the upper bound. Table 17 shows the in-zone ranges according to each rank's time in grade during the PSB.

Table 17. Calculated Zones for the Study

	Upper Bound	Lower Bound
O5 In – Zone for CAPT	86 months	58 months
O4 In – Zone for CDR	81 months	48 months
O3 In – Zone for LCDR	66 months	53 months

E. PROMOTION DETERMINATION

Since, the DMDC data does not indicate promotion status, the variable “rank effective date” that states the date of rank for an individual is used to determine when an officer promotion has occurred. Additionally, FY variables are generated for the study to indicate the time frame of consideration. For example, if a LCDR's date of rank falls from

October 1, 2018, through September 30, 2019, the officer promoted in FY19. The information also indicates that the LCDR was selected during the FY19 PSB, which convened in May 2018. Therefore, an officer's date of rank that falls from October 1, 2019, to September 30, 2020, promoted in FY20 and was selected for promotion during the FY20 PSB which convened in 2019. Promotion to CDR and CAPT is defined in the same manner

F. LIMITATIONS.

Without zones information and accurate promotion indicators, the study is susceptible to calculation errors. One potential source of error is that promotion rates for the calculate zone are significantly lower than the actual promotion rates of 80 percent for LCDR, 70 percent for CDR and 50 percent for CAPT according to DOPMA as stated by (Hosek et al., 2001, p. 20). To overcome this limitation, I performed a grid search to closely match the empirical in-zone promotion rates to the Navy's published promotion rates. The promotion rates for the current study, as calculated by the zones are LCDR 79 percent, CDR 67.6 percent, and CAPT 65 percent.

The calculated zones, after the grid search are narrower than the previously calculated zones without the grid search. Another potential source of error is that the zones for all competitive communities in the study are based off the URL community's calculated zones. The flow points, which is the average number of commissioned years when an officer promotes to the next rank (Ray, 2012, p. 7), may differ for community to community and between line and staff. Since the zones were calculated from the URL community, the calculation fails to capture the approximate zone of other communities with different flow points. Officers in a community other than URL may appear to be above zone in the study but be in-zone for a different community due to the difference in flow points.

For consistency of the study all PSB occurs in the same month of the FY regardless of the date the board occurs, for calculation purposes. For example, all O6 boards occurs in January, O5 boards occurs in March, and O4 boards occurs in May. Recently, staff O5 boards shifted from March to May to correspond with the staff O4 boards. This slight change may also result in measurement errors.

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IV. METHODOLOGY

I estimate LPM to relate how the promotion outcomes for minorities and females during PSBs changed when photos are masked. Rank is divided into three categories where promotion is competitive (LCDR, CDR, and CAPT). Since a policy change to reinstate the officer photos on the PSBs occurred in 2018, the PSBs in consideration for the study are FY19 and FY20. The treatment for the study is having photos masked during the PSBs and the control group are the PSBs where photos are not masked.

Specifically, I estimate the following LPM equation for promotion outcomes:

$$Y_i = \beta_o + \beta_1 * minority_i + \beta_2 * minority_i * (photosmasked) + x_i\lambda + \varepsilon_i$$

where Y_i is the probability outcome that officer i will be promoted, β_1 is the estimated coefficient on an indicator variable for a minority who is in-zone for promotion, β_2 is the coefficient on the interaction between the treatment of masking photos during the PSB and the minority dummy variable, x_i represents all the covariate variables, and ε_i is the error term.

The LPM is also used to estimate the treatment effects on the promotion outcomes of female officers. Although female officers can be minorities, the purpose of this model is to estimate the treatment effect on gender alone.

The following LPM estimates the promotion outcomes for female officers:

$$Y_i = \beta_o + \beta_{1i} * females_i + \beta_2 * females_i * (photosmasked) + x_i\lambda + \varepsilon_i$$

where Y_i is the probability outcome that an officer will be promoted, β_1 is the estimated coefficient on an indicator variable for a female who is in-zone for promotion β_2 is the coefficient on the interaction between the treatment of masking photos during the PSB and female indicator, x_i represents all the covariate variables, and ε_i is the error term.

The next models estimate the effects of the board's ethnic and gender composition on the probability outcomes of promotions on individual minority and female naval officers. By using the officer's time in rank, current rank, and designator, we can determine the exact board that the officer is eligible to be selected for promotion. With the board

member's information on FY, rank, and designator, we can identify the PSB that the member voted on. The FY, rank, and designator information allows us to match the promotion candidate to their specific PSB.

The following LPM estimates the effect of minority percentage composition of the board on the promotion of minorities:

$$Y_i = \beta_o + \beta_1 * minority_i + \beta_2 * \%minorities_i + \beta_3 * minority_i * (\%minorities_i) + x_i\lambda + \varepsilon_i$$

where Y_i is the probability outcome of promotion for an individual officer who is in zone to promote to the next rank, β_1 is the estimated coefficient for being in a minority, β_2 is the coefficient on percentage of minorities on the PSB that the individual is in zone for, β_3 is the coefficient on the interaction between the minority indicator and the percentage of minorities on the PSB, x_i represents all covariate variables, and ε_i is the error term.

Similar to the LMP with the treatment of photo masking, we are interested in the effects of the percentage of females on the promotion outcomes of female officers alone.

The following LPM estimates the effect of female percentage composition of the board on the promotion of females:

$$Y_i = \beta_o + \beta_1 * females_i + \beta_2 * \%females_i + \beta_3 * females_i * (\%females_i) + x_i\lambda + \varepsilon_i$$

where Y_i is the probability outcome of promotion for an individual officer who is in zone to promote to the next rank, β_1 is the estimated coefficient for female indicator, β_2 is coefficient the percentage of females on the PSB that the individual is in zone for, β_3 is the interaction between the female indicator and the percentage of females on the PSB, x_i represents all covariate variables, and ε_i is the error term.

V. RESULTS AND ANALYSIS

Using DMDC data, I estimate LPM models relating the probability of promotion for minorities and female naval officers with or without photos masked during the PSBs. The limitations of the results are due to utilizing simulated zones in place of actual zone status for officers that are absent from the DMDC data. Additionally, the simulated zones are based on the URL 11XX community that may increase the possibility of errors because other communities may have different flow points when compared to the URL community.

A. PROMOTION OUTCOMES FOR MINORITIES

In this section, I will discuss the estimates that are statistically significant for minorities. Table 18 shows the overall regressions for promotion to LCDR, CDR, and CAPT. Looking across the minority indicator variable, minorities are 4.3 percentage points significantly less likely to promote to LCDR (column 1) and 5.5 percentage points significantly less likely to promote to CDR (column 3) without controlling for the photo masking policy. Second, with controls for the photo masking policy and its interaction with the minority indicators, the effect of minority becomes insignificant; minorities are 7.3 percentage points less likely to promote to LCDR (column 2, $0.027+0.046$), but this estimate is not statistically different from zero. This insignificant estimate is used to show the difference in magnitude. Furthermore, minorities are 1.7 percentage points significantly less likely to promote to CDR (column 4, $-0.082+0.065$); this joint effect of minority status on promotion is statistically different from zero using a t-test. This estimate partially concurs with the CNP's statement that masking photos harms the promotion for minorities who are IZ for CDR.

Other statistically significant controls include officers who are Surface Warfare qualified and Nuclear Power School trained who have a higher probability of promoting to LCDR, CDR, and CAPT, compared to officers without the qualifications. In contrast, Staff Corps officers have a statistically negative probability of promotion to LCDR and CDR, compared to other officers. Regarding officer accession, Naval Academy graduates have a statistically lower probability of promoting to LCDR. However, the officers who commissioned through the Naval Academy, Naval Reserve Officer Training Corps

(NROTC), and Officer Candidate School (OCS) have a statistically positive probability of promoting to CDR.

B. PROMOTION OUTCOMES FOR FEMALES

Table 19 shows the promotion outcome estimates for female officers during FY19 and FY20 PSBs. Without controlling for the masking policy, differences in the promotion outcomes of males vs. females are not statistically different from zero (coefficient on Female=1 in columns 1, 3, 5). Taken together, masking photos or not masking photos during the PSBs have no effect on the promotion outcomes for females.

The significant controls for females include the same operational and accession source variables as minorities. For instance, the statistically significant controls include the following indicator variables for: age, married with spouse only, SWO, Nuclear Power School trained, Naval Academy, NROTC, and OCS. More specifically, regarding age, older officers have a statistically lower probability of promoting to LCDR and CAPT. However, the estimated magnitudes are considerably low at 0.5 and 1 percentage point for LCDR and CAPT (column 2 and column 6) respectively. Moreover, officers who are married without children (with spouse only as indicated in Table 19) are statistically less likely to promote to LCDR regardless of whether photos are masked or not masked, and the estimates are statistically different from zero (column 1 and column 2). Last, having photos masked increases the likelihood of promoting to CAPT by 4.9 percentage points for all officers and is statistically significant from zero (column 6, 6.1-1.2).

The coefficients on the minority in Table 18 and female indicators in Table 19 are significantly increased when controlling for the operational related accomplishments. For example, the indicators for SWO or Nuclear Power School trained increases the likelihood for promotion regardless of the photo masking policy. This finding indicates that operational assignments are highly valued for promotion and validates the claim that officers who are assigned to operational tours are more competitive for promotion as opposed to officers who are unable to take on operational tours, due to the preference for assigning minorities to recruiting duties that serve as part of the Navy's attempts to recruit more minority sailors.

Table 18. Minority Promotion to LCDR, CDR, and CAPT Without Photos

	(1) LCDR	(2) Treatment	(3) CDR	(4) Treatment	(5) CAPT	(6) Treatment
Minority=1	-0.043* (0.021)	-0.027 (0.026)	-0.055* (0.026)	-0.082* (0.034)	-0.034 (0.034)	-0.025 (0.044)
Age	-0.005* (0.002)	-0.005* (0.002)	-0.001 (0.002)	-0.002 (0.002)	-0.010** (0.004)	-0.010** (0.004)
Married w/ spouse only	-0.087* (0.036)	-0.084* (0.036)	-0.021 (0.048)	-0.014 (0.048)	-0.076 (0.062)	-0.071 (0.062)
Married w/ kids	-0.035 (0.025)	-0.034 (0.025)	0.031 (0.027)	0.034 (0.027)	-0.011 (0.035)	-0.007 (0.035)
Staff	-0.264*** (0.023)	-0.263*** (0.023)	-0.117*** (0.028)	-0.124*** (0.028)	-0.002 (0.037)	-0.004 (0.037)
Surface Warfare Officer	0.227*** (0.024)	0.228*** (0.024)	0.111*** (0.029)	0.110*** (0.029)	0.265*** (0.038)	0.257*** (0.038)
Fleet Marine Force	-0.015 (0.054)	-0.015 (0.054)	0.039 (0.068)	0.040 (0.068)	0.173 (0.122)	0.176 (0.122)
Executive Medicine	0.015 (0.063)	0.010 (0.063)	-0.030 (0.061)	-0.026 (0.061)	0.039 (0.059)	0.030 (0.059)
Nuc Power School Trained	0.213*** (0.050)	0.208*** (0.050)	0.203*** (0.043)	0.204*** (0.043)	0.327*** (0.066)	0.333*** (0.066)
Naval Academy	-0.111** (0.039)	-0.118** (0.039)	0.099** (0.037)	0.101** (0.037)	-0.074 (0.048)	-0.082 (0.048)
NROTC	-0.053 (0.036)	-0.057 (0.036)	0.142*** (0.036)	0.141*** (0.036)	0.014 (0.046)	0.008 (0.046)
OCS	-0.025 (0.027)	-0.026 (0.027)	0.123*** (0.034)	0.120*** (0.034)	0.009 (0.039)	0.010 (0.039)
No Photos=1		0.034 (0.021)		0.038 (0.023)		0.062* (0.028)
Minority=1 X No Photos=1		-0.046 (0.043)		0.065 (0.052)		-0.020 (0.068)
Observations	2591	2591	1434	1434	1289	1289
R ²	0.155	0.156	0.139	0.144	0.073	0.077

Adapted from DMDC data. The table contains data from FY19 and FY20 PSBs. Standard errors in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 19. Female Promotion to LCDR, CDR, and CAPT Without Photos

	(1) LCDR	(2) Treatment	(3) CDR	(4) Treatment	(5) CAPT	(6) Treatment
Female=1	0.018 (0.022)	-0.003 (0.026)	-0.026 (0.026)	-0.062 (0.036)	0.039 (0.035)	0.044 (0.046)
Age	-0.005* (0.002)	-0.005* (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.010** (0.004)	-0.010** (0.004)
Married w/ spouse only	-0.083* (0.036)	-0.080* (0.036)	-0.022 (0.048)	-0.017 (0.048)	-0.078 (0.062)	-0.072 (0.062)
Married w/ kids	-0.030 (0.025)	-0.028 (0.025)	0.031 (0.027)	0.036 (0.027)	-0.009 (0.035)	-0.005 (0.035)
Staff	-0.267*** (0.024)	-0.266*** (0.024)	-0.110*** (0.028)	-0.116*** (0.028)	-0.002 (0.037)	-0.005 (0.037)
Surface Warfare Officer	0.225*** (0.024)	0.226*** (0.024)	0.112*** (0.029)	0.112*** (0.029)	0.265*** (0.038)	0.257*** (0.038)
Fleet Marine Force	-0.012 (0.054)	-0.011 (0.054)	0.032 (0.068)	0.033 (0.068)	0.172 (0.122)	0.174 (0.122)
Executive Medicine	0.013 (0.063)	0.008 (0.063)	-0.036 (0.061)	-0.035 (0.061)	0.028 (0.060)	0.019 (0.060)
Nuc Power School Trained	0.218*** (0.050)	0.217*** (0.050)	0.203*** (0.043)	0.203*** (0.043)	0.336*** (0.066)	0.342*** (0.066)
Naval Academy	-0.110** (0.039)	-0.116** (0.039)	0.095* (0.037)	0.099** (0.037)	-0.071 (0.048)	-0.080 (0.048)
NROTC	-0.050 (0.036)	-0.052 (0.036)	0.144*** (0.036)	0.145*** (0.036)	0.016 (0.046)	0.009 (0.046)
OCS	-0.023 (0.027)	-0.025 (0.027)	0.122*** (0.034)	0.121*** (0.034)	0.011 (0.039)	0.011 (0.039)
No Photos=1		0.009 (0.021)		0.037 (0.023)		0.061* (0.028)
Female=1 X No Photos=1		0.069 (0.044)		0.066 (0.050)		-0.012 (0.068)
Observations	2591	2591	1434	1434	1289	1289
R ²	0.154	0.155	0.137	0.142	0.073	0.077

Adapted from DMDC data. Standard Errors in Parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

C. PROMOTED VS. NOT PROMOTED

Table 20 shows the summary statistics of the overall results of promotion to LCDR, CDR, and CAPT for the study. Due to the necessary steps of having to calculate the zones, then performing a grid search to match true promotion rates, the numbers may differ slightly from actual promotion results. The numbers correspond with the 2020 military demographics. One notable finding is that all races other than White or unknown have a higher percentage of “not promoted” than “promoted.”

Table 20. Summary Statistics of Race and Gender and Promotion

Variables	Promoted	Not Promoted
American Indian Alaskan Native	0.004	0.005
Asian Pacific Islander	0.051	0.065
Black	0.090	0.097
Hispanic	0.079	0.084
White	0.783	0.748
Multi Race	0.023	0.037
Unknown Race	0.025	0.023
Female	0.182	0.225
N =	1778	3180

Adapted from DMDC.

D. EFFECTS OF BOARD MEMBER RACIAL COMPOSITION ON PROMOTION OUTCOMES

In this section, I will discuss the estimates that are statistically significant for minorities. The effects of the board members’ racial composition on the outcome of minority promotion are seen in Table 21.

The pattern on the interaction term is 0.163 for LCDR (column 2). Although statistically insignificant, we can interpret this as showing that a 10 percentage point increase in minority representation on promotion boards increases the likelihood of minority candidate being promoted by 1.63 percentage points more than the impact on non-minority candidates.

This section answers the research question: does the percentage of minorities on the PSB have an effect on the promotion of minorities. Based on the results of the table, the percentage of minorities on the PSB appear to help the probability of promotion to LCDR for minorities.

Table 21. Minority Promotion to LCDR, CDR, and CAPT, Based on the Percentage of Minority Board Members

	(1) LCDR	(2) Percentage of Minority Board Members	(3) CDR	(4) Percentage of Minority Board Members	(5) CAPT	(6) Percentage of Minority Board Members
Minority=1	-0.092*** (0.020)	-0.142** (0.047)	-0.064* (0.025)	-0.148 (0.087)	-0.024 (0.034)	-0.036 (0.112)
%Minority		-0.948*** (0.086)		-0.326* (0.166)		-1.496*** (0.298)
Minority=1 X %Minority		0.163 (0.173)		0.243 (0.407)		0.154 (0.632)
Observations	2591	2591	1434	1434	1289	1289
R ²	0.006	0.082	0.004	0.013	0.000	0.034

Adapted from DMDC data. Female promotion to LCDR, CDR, CAPT, based on the percentage of females on the PSB. Standard errors in parenthesis.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

E. EFFECTS OF BOARD MEMBER GENDER COMPOSITION ON PROMOTION OUTCOMES

Table 22 shows the results of the LPM model. In this section, I will discuss the estimates that are statistically significant for females. To put into perspective, the interaction of the percentage of female board members with the female indicator variable shows the effects of the gender composition of PSBs on the promotion outcomes of females are similar to the estimates for minorities.

The parameter on the interaction term is 0.239 for LCDR. Although statistically insignificant, we can interpret this as showing a 10 percentage point increase in female representation on promotion boards increases the likelihood of a female candidate being promoted by 2.39 percentage points more than the impact of male candidates.

Table 22. Female Promotion to LCDR, CDR, and CAPT, Based on the Percentage of Female Board Members

	(1) LCDR	(2) Percentage of Female Board Members	(3) CDR	(4) Percentage of Female Board Members	(5) CAPT	(6) Percentage of Female Board Members
Female=1	-0.052** (0.019)	-0.106* (0.048)	-0.056* (0.026)	-0.110 (0.092)	-0.001 (0.037)	-0.052 (0.050)
%Female		-0.631*** (0.092)		-0.765*** (0.150)		-0.010 (0.038)
Female=1 X %Female		0.239 (0.179)		0.183 (0.322)		0.031 (0.063)
Observations	2591	2591	1434	1434	1289	1289
R ²	0.002	0.031	0.003	0.045	0.000	0.001

Adapted from DMDC data. Female promotion to LCDR, CDR, CAPT, based on the percentage of females on the PSB. Standard errors in parenthesis.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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VI. CONCLUSION AND RECOMMENDATIONS

The purpose of this study is to analyze promotion probabilities to determine the validity of the CNP's statement that removing photographs harms diversity. The study provides a broad overview of how the availability of the officer photos affect promotion probability of minorities and women. I find that the effects masking the photos in PSB on the promotion rates for minorities or women were not statistically significant when analyzing the promotion results of two years of PSB, where one year photos were not visible and the second year the photos were visible. However, when controlling for the interaction between minorities and the masking policy, the estimate for CDR become statistically different from zero, indicating minorities have a decreased likelihood of promoting to CDR when photos are not shown to the PSB. Since the change only affects promotion to CDR, the I am unable to confirm or disprove the CNP's broader statement that masking photos harms diversity in the Navy.

When analyzing the effects of the board composition of minorities on the promotion of minorities, I find that the composition of minorities is significant for minorities when promoting to LCDR, where the increased number of minorities on the board increases likelihood of promotion for minorities. For minorities, the promotion to CDR is significantly less likely, but promotion to CDR and CAPT is not significantly different.

Regarding the percentage of female board members on the promotion probability for females, the female dummy indicator shows promoting to LCDR is also significantly more likely when controlling for the interaction of the percentage of female board members to the female indicator. Overall, the board composition that tend to have a higher percentage of minorities or a higher percentage of females tend to promote more minorities and more females to LCDR. However, the estimates are insignificant for CDR and CAPT for both groups.

Furthermore, the consistent control estimates that are statistically different from zero among all four models is being a SWO and Nuclear Power School Trained which supports the fact that operational assignments are highly valued during PSBs.

One recommendation for future study is to obtain a wider time frame to obtain a promotion rate outcome baseline with multiple years. Also, the change from not having photos masked to masking photos has occurred three times since 2016. The latest promotion results of the change in FY20 are unavailable at the time of the study. Future research could analyze the promotion outcomes for all three changes.

However, one potential practice implemented by the Navy that may be harming diversity and inclusion is the preference for assigning minorities officer to recruiting duties in the attempt to increase minority recruits. Recruiting tours reduces their opportunities to take on operational assignments, which makes them less competitive for promotion. The results of the study show that operational controls are statistically significant with or without the treatment of masking photos, which signals the importance of assuming operational tours. Shifting practice does not necessarily undermine the minority recruiting goals. When minorities see people that they identify with in operational settings, they will realize the opportunities in the military and be more motivated to join. However, this study highlights the potential policy changes for improving diversity and inclusion within the officer ranks.

LIST OF REFERENCES

- Asch, B. J., Miller, T., & Malchiodi, A. (2012). A new look at gender and minority differences in officer career progression in the military. (Report No. TR-1159-OSD). RAND. https://www.rand.org/pubs/technical_reports/TR1159.html
- Asch, B., Miller, T., & Weinberger, G. (2016). Can we explain gender differences in officer career progression? (Report No. RR-1288-OSD). RAND. <https://www.rand.org/t/RR1288>
- Bellemore, F. A. (2001). Racial and ethnic employment discrimination: Promotion in Major League Baseball. *Journal of Sports Economics*, 2(4), 356–368. <https://doi.org/10/btfd2s>
- Bertrand, M., & Mullainathan, S. (2004). Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *The American Economic Review*, 94(4), 991–1013. <https://doi.org/10/fwx5fm>
- Bigler, K. M. (2000). *The use of official photographs in the Army officer promotion selection board process*. [Strategy research project, U.S. Army War College]. Defense Technical Information Center.
- Burk, J., & Espinoza, E. (2012). Race relations within the U.S. military. *Annual Review of Sociology*, 38(1), 401–422. <https://doi.org/10/gj5589>
- Correll, D. S. (2021, August 23). *CNP: Removing photos from promotion boards has hurt diversity*. Navy Times. <https://www.navytimes.com/news/your-navy/2021/08/03/cnp-removing-photos-from-promotion-boards-has-hurt-diversity/>
- Darrow, C., Eitelberg, M., & Mehay, S. (1995). *The impact of the force drawdown on the promotion of minority officers in the U.S. military* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. <http://hdl.handle.net/10945/31535>
- Department of Defense (n.d.) *2020 Demographics profile of the military community*. Retrieved August 26, 2021, from <https://download.militaryonesource.mil/12038/MOS/Reports/2020-demographics-report.pdf>
- Department of Defense Board on Diversity and Inclusion. (2020, December 19). DOD Board on Diversity and Inclusion Report: Recommendations to improve racial and ethnic diversity and inclusion in the U.S. military. <https://media.defense.gov/2020/Dec/18/2002554852/-1/-1/0/dod-diversity-and-inclusion-final-board-report.pdf>
- Ehrenberg, R. G., & Smith, R. S. (2018). *Modern Labor Economics: Theory and Public Policy* [E-reader version] (13th ed.). Routledge.

Exec. Ord. No. 9981 (July 26, 1948) <https://catalog.archives.gov/id/300009>

Goldin, C., & Rouse, C. (2000). Orchestrating impartiality: The impact of “blind” auditions on female musicians. *The American Economic Review*, 94(4), 715–741. <https://doi.org/10/bcp9jv>

Hosek, S. D., Tiemeyer, P. T., Kilburn, R. M., Ducksworth, S., & Strong, D. A. (2001). *Minority and gender differences in officer career progression*. RAND Corporation.

Lang, K., & Spitzer, A. K.-L. (2020). Race discrimination: An economic perspective. *Journal of Economic Perspectives*, 34(2), 68–89. <https://doi.org/10/gg9xt5>

Pudney, S., & Shields, M. A. (2000). Gender and racial discrimination in pay and promotion for NHS nurses. *Oxford Bulletin of Economics and Statistics*, 62(s1), 801–835. <https://doi.org/10.1111/1468-0084.0620s1801>

Ray, H. B. (2012). *Navy Nurse Corps promotion during war the deployment effect* [Master’s thesis, Naval Postgraduate School]. NPS Archive: Calhoun. <http://hdl.handle.net/10945/6858>

Rostker, B., United States, and Defense Research Institute (Eds.). (1993). *The Defense Officer Personnel Management Act of 1980: A retrospective assessment*. Rand.

Salas, M. E. (2015). *An analysis of promotion and retention factors among Hispanic and non-Hispanic Marine Corps officers*. [Master’s thesis, Naval Postgraduate School]. NPS Archive: Calhoun. <http://hdl.handle.net/10945/45249>

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