NPS-HR-22-221

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Joint Professional Military Education: The Impact of Broadened Learning on Medical Staff Officers

March 2022

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Prepared for the Naval Postgraduate School, Monterey, CA 93943

ACQUISITION RESEARCH PROGRAM
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The research presented in this report was supported by the Acquisition Research Program of the Department of Defense Management at the Naval Postgraduate School.

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ABSTRACT

Joint Professional Military Education, Phase I (JPME-I) is an underutilized educational opportunity among the Navy's medical staff officers at a time of increasing jointness and complexity in the delivery of healthcare across the Military Health System. I employ a quantitative multivariate approach using individual-level personnel data from the Navy's Officer Personnel Information System (OPINS) to study the 2001–2005 cohorts of Navy medical staff corps personnel to ascertain the relationship between JPME-I completion and an officer's probability of promotion to O-4 and O-5. I find that the completion of JPME-I, by itself, has no significant predictive power on the probability of promotion but that JPME-I completion in combination with two other courses of professionally broadening education does predict higher likelihood of selection for promotion to both O-4 and O-5. Recent changes in the delivery of the JPME-I curriculum improve the convenience and efficiency for officers who choose to pursue this enriching course of study. Senior medical staff corps officers can enhance their subordinates' professional development when they encourage the completion of JPME-I as part of a learning strategy that integrates a broad range of educational experiences.

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ACKNOWLEDGMENTS

The completion of this research would not have been possible without the support and guidance of Dr. Simona Tick. I greatly appreciate her insight throughout the thesis process and her encouragement to pursue this particular topic, one that has interested and motivated me for a number of years.

Dr. Mie-Sophia Augier instructed my first class on my first day of enrollment at the Naval Postgraduate School. Her passion for education, thinking, and learning inspired me for the duration of my time here, and I am grateful for the opportunity to have studied with her.

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LIST OF ACRONYMS AND ABBREVIATIONS

AQD	Additional Qualified Designator
BUMED	Navy Bureau of Medicine and Surgery
BUMIS	BUMED Manpower Information System
CHCA	Credentialed Health Care Administrator
CNO	Chief of Naval Operations
DC	Dental Corps
DHA	Defense Health Agency
DOD	Department of Defense
FMF	Fleet Marine Force
FY	Fiscal Year (1 October through 30 September)
GNA	Goldwater-Nichols Department of Defense Reorganization Act
JCS	Joint Chiefs of Staff
JPME	Joint Professional Military Education
JPME-I	Joint Professional Military Education, Phase 1
LPM	Linear Probability Model
MC	Medical Corps
MHS	Military Healthcare System
MSC	Medical Service Corps
MTF	Medical Treatment Facility
NAVADMIN	Navy Administrative Message
NC	Nurse Corps
NWC	U.S. Naval War College
OPINS	Officer Personnel Information System
RL	Restricted Line
SWMDO	Surface Warfare Medical Department Officer
URL	Unrestricted Line
USMC	United States Marine Corps
YG	Year Group

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I. INTRODUCTION

The Navy Medicine enterprise is made stronger by officers who think broadly. Staffed with highly educated individuals, many of whom are already in possession of a graduate degree prior to commissioning, these officers are specifically recruited into the Navy for their specialized training and the benefit it brings to the medical system. These officers will carry out duties in the healthcare arena, whether stationed at a Medical Treatment Facility (MTF) or while deployed with operational forces. The expertise that they bring to their jobs is fundamental to the fulfillment of the medical mission that cares for warfighters, service members' dependents, and military retirees. With this specialty-specific acumen as a baseline, medical leaders' skillsets are further enhanced when their area of specialization is augmented through the pursuit of a broadened curriculum of learning.

Contemporary leaders live under the fallacy that specialization breeds expertise and that, subsequently, enough individual experts can create a high-performing system. It is true that the highly complex clinical, administrative, and scientific tasks taken on by the Navy's medical professionals are perfected over time. Each officer's natural talent is augmented by relentless training and hours of repetition in pursuit of proficiency. As with chess grandmasters and concert violinists, modern culture has been infused with the idea that the attainment of expert-level performance can take as many as 10,000 hours of practice to achieve (Gladwell, 2008). The Navy's medical staff officers are given the opportunity and expectation to hone their craft and become masters in their areas of expertise over the course of their careers. As career advancement leads them upward through the organization, it must be considered that their primary domain of specialization should evolve in a manner commensurate with their rank.

Broad-thinking generalists have an advantage in our organization, as compared to hyper-focused specialists, when it comes to solving complex problems (Epstein, 2021). Society has conditioned us in recent years to adopt the mantra that silos are bad. Cross-training and system-think are buzzwords du jour, with leaders and followers alike being taught to think creatively to find interdisciplinary solutions to commonly held problems.

Being a generalist is not easy, as it seems that humans naturally and reliably fall back on what they know best, succumbing to cliques of expertise. Our personal worldview is shaped by our training and our experiences; even as we grow and advance to higher levels of responsibility within our organizations, we find it hard to resist the urge to frame a situation within the construct of our area of expertise. The current model that encourages the tireless pursuit of perfection within a narrowly focused clinical scope may serve as insufficient preparation for the systemic ills that senior medical officers are called upon to remedy.

Basic economic theory proffered by Adam Smith posits that all stakeholders are made better off when specialization and trade are encouraged to take place (Smith, 1991). Rather than each individual in a system needing to be able to do a little bit of everything, silos of experts are allowed to develop, and then each cadre's wares can be traded among the others for the benefit of the greater good. Where Smith envisions a guiding force within the marketplace to divide the spoils, Epstein's construct of range argues that generalists create the commonality between the myriad silos, enabling the underlying function of the marketplace that permitted the development of specialization in the first place (Epstein, 2021; Smith, 1991). Epstein's generalists and Gladwell's connectors are the people who make our world work; they are the guiding force personified, recognizing the value within each of the silos and filling the interstitial space between them (Epstein, 2021; Gladwell, 2006). Their widened field of vision can see problems at the organizational level and harness opportunities that self-interested specialists cannot observe through their narrowed apertures. Specialization and trade may make for a more efficient marketplace, but broad-thinking leaders are required to build the framework for success, operate the weighing scales, and marshal resources to the areas where they are needed most.

Navy Medicine is staffed by thousands of officers of varying specialties, each bringing their expertise to bear every single day. With their disparate roles, career paths, and required levels of education dictated by the duties that the Navy has charged them with fulfilling, it is somewhat difficult to separate the specialists from the generalists so as to ascertain their respective performance. Graduate education may serve as a marker of motivation and commitment to learning, but many officers within the medical community have previously achieved advanced education on their pathway to commissioning. The

military-specific educational opportunity offered through the completion of Joint Professional Military Education, Phase 1 (JPME-I) provides an appropriate proxy indicator for officers who have expressed a commitment to view their role in the Navy as larger than that of the specific medical duties through which they primarily serve the organization. The level of academic tenacity that is required to complete this course of study is such that temporary commitment to its pursuit cannot be easily misconstrued with a genuine motivation for self-improvement. With its focus on strategy, joint operations, and theater-level decision making, completion of JPME-I serves as a suitable marker for those medical staff officers with the greatest potential to be broad, critical thinkers within the complex enterprise that is Navy Medicine.

The essential question at hand is whether the four Navy medical staff corps are appropriately utilizing JPME-I, individually and collectively, as a framework to instill a culture of interservice competence among their respective officers. The Defense Health Agency (DHA) is a joint, tri-service military command charged with oversight of the delivery of the military healthcare benefit to all eligible recipients: current, past, and future. Created in 2013, it carves the administration of healthcare facilities out from under each individual service, leaving the Army, Navy, and Air Force to staff their operational medical billets while the DHA provides all garrison-based and network care (Kime, 2015). Although each service's medical professionals continue to deploy in support of service-specific platforms, assignment to a DHA facility now involves a level of understanding of other service's structures, responsibilities, and capabilities.

This thesis investigates whether members of the Navy's medical staff corps who have completed JPME-I experienced significantly different rates of promotion to the grades of O-4 and O-5 over the past ten years, as compared to those demographically and professionally comparable officers who have not yet successfully completed the curriculum. It finds that the completion of JPME-I, by itself, has no significant predictive power on the probability of promotion, but that JPME-I completion in combination with two other courses of professionally broadening education does predict higher likelihood of selection for promotion to both O-4 and O-5.

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II. BACKGROUND

The Navy Medicine enterprise serves as an integral supporting component of our national defense system, and it evolves to meet the challenges of the environment and era. Service-specific capabilities across the Army, Navy, and Air Force medical complements have been driven toward the concept of jointness by a need for increased efficiency, economies of scale, and reductions in redundancy. Congressionally derived mandates have created opportunity and incentive for the services to act in concert with one another, rather than to merely coexist within the same battlespace. The provision of medical services is no exception, with the three medical forces being afforded the chance to work together in pursuit of common goals while retaining their individual service's culture. Recent progression in medical jointness strategies and operations has created the impetus to measure the value placed on formal education within this sphere. As the Navy's medical executives become further exposed to leading the delivery of medical care in a joint environment, it is important to understand how formal education in the principles of jointness can lead to career advancement for these leaders.

A. THE GOLDWATER-NICHOLS ACT

The Goldwater-Nichols Department of Defense Reorganization Act (GNA) passed both houses of Congress and was signed into law in October 1986 (Nichols, 1986). The driving force behind the new legislation was born of congressional dissatisfaction with the coordination of military strategy and tactics across the services in the early 1980s (Hamre, 2016). The startling lack of communication and interoperability during such disparate operations as the mission to rescue American hostages held in Iran and the invasion of Grenada alerted legislative overseers that the long-held management systems in place within the Pentagon could no longer be passively tolerated and needed to be actively modernized by external force (Hamre, 2016). Adoption of the GNA ushered in a new era of jointness in military planning and operations.

B. JOINT PROFESSIONAL MILITARY EDUCATION (JPME)

Key to the dissemination of the principles of joint planning and operations was the provision of targeted educational studies for both senior and junior officers. The GNA introduced the requirement that JPME completion be required for an officer to obtain eligibility for promotion and assignment to certain joint duties (Kamarck, 2016). Sequential courses of study were to be interleaved with periods of experiential learning, and the end goal was to improve the quality of joint officers (Kamarck, 2016). The integration of joint concepts into military education and the cross-pollination of ideas across the services would produce a cadre of officers better equipped to work in concert with one another, rather than in parallel.

A renaissance in JPME-I course delivery took place in 2019 as the U.S. Naval War College (NWC) streamlined the content of its online program, enabling a reduction in completion time from two years down to ten months (Steele, 2019). Commensurate in length to the ten-month in-person program of study delivered in Newport, Rhode Island, and shorter in duration than the three years of distributed learning required by the Fleet Seminar Program, NWC's College of Distance Education shortened the delivery time while maintaining graduate-level educational standards (Steele, 2019). Sea service officers in the grades of O-3 and above gained a pathway to JPME-I completion from the convenience of their current duty station and can do it all in less than one year's time (U.S. Naval War College, n.d.).

Simultaneously, the Navy's efforts to update its personnel management systems placed additional emphasis on JPME-I completion. NAVADMIN 247/19, released on November 1, 2019, clarified the requirement that Unrestricted Line (URL) Officers complete JPME-I prior to the assumption of O-5 command-at-sea and further reinforced the following principles:

> This policy change aligns Navys (sic) talent management strategy with the need to develop critical thinkers and dynamic leaders in an era of Great Power Competition. The goal is to man the Fleet with the right Officers, possessing the right education, at the right time.

> JPME develops officers with a broad depth of knowledge and problem-solving skills, enhancing Navys (sic) ability to deliver maritime superiority across the spectrum of high-end conflict in support of the Combatant Commanders. We strongly encourage all URL, RL and Staff Corps officers to seek available options to achieve JPME (e.g. in-residence, distance learning, Fleet Seminar Program). Officers should discuss JPME opportunities with their detailers and establish a plan to complete this important professional requirement consistent with their career goals. (Office of the Chief of Naval Operations, 2019, sec. 3-4)

Six months later, the Joint Chiefs of Staff (JCS) collectively echoed the importance of the JPME curriculum in the development of tomorrow's successful joint officers (Lacey, 2020). They pointed to stagnation in the current curriculum and a need to revitalize methods of instruction to hone the critical thinking skills required of modern military leaders (Lacey, 2020). As evolving talent management strategies point students with the greatest potential into advanced professional military studies, the JCS wanted to incentivize outstanding academic performance by tying it to future assignments and promotions (Lacey, 2020).

C. THE DEFENSE HEALTH AGENCY

The DHA was ushered into existence on October 1, 2013, in response to calls from congressional leaders and from within the Department of Defense (DOD) to increase interservice cooperation between the Army, Navy, and Air Force in the delivery of the medical benefit, while reining in skyrocketing healthcare costs (Kime, 2015). The agency's initial focus was on reducing administrative redundancies in the core areas of contracting, facilities, information technology, and purchasing (Kime, 2015). Expanding its scope in 2019, the DHA assumed joint, integrated administrative control of all military hospitals and clinics as part of managing the TRICARE health benefit for 9.6 million beneficiaries (Military Health System Communications Office, 2020). The need for individual military medical officers to be well-versed in each service's culture and peculiarities continues to grow as the DHA becomes more ensconced as the joint, interagency, directive authority of the Military Health System.

D. NAVY MEDICINE

The officers, enlisted sailors, civilians, and contractors of Navy's Bureau of Medicine and Surgery (BUMED) are tasked with providing a medically ready force in support of the military defense mission of the nation's Navy-Marine Corps combat team. The Navy's medical force is composed of commissioned officers, enlisted Hospital Corpsmen, civilian employees of the individual services and the DOD, and clinical and administrative supporting contractors. Commissioned officers within the Navy Medicine enterprise belong to one of four professional corps: the Medical Corps (MC), Dental Corps (DC), Medical Service Corps (MSC) and Nurse Corps (NC). Table 1 provides a breakdown of the O-3 to O-6 membership in each officer corps by rank/grade.

Table 1. Medical Staff Officers by Corps and Rank/Grade. Adapted from BUMED Manpower Information System (2021).

	O-3	O-4	O-5	O-6	Total
MC	1,460	1,153	619	378	3,610
DC	529	301	167	142	1,139
MSC	1,193	720	318	159	2,390
NC	1,083	590	290	123	2,086
Total	4,265	2,764	1,394	802	9,225

As of December 2021.

E. MEDICAL OFFICERS AND JPME

Medical staff officers are not subject to the same incentives and requirements for JPME completion as URL officers are. Completion of any portion of JPME is not currently a prerequisite for promotion to any paygrade for medical staff officers. The FY-22 Promotion Selection Board Convening Orders for O-4, O-5, and O-6 staff officers each contains guidance for the selection board members to place positive value on an officer's completion of JPME, but none goes so far as to direct the members of the board to weight the credential in the same manner as the URL community does (Office of the Assistant Secretary of the Navy [Manpower and Reserve Affairs], 2021). In the absence of career-based incentives to complete JPME, those medical staff officers who are enticed to

undertake this course of study become set apart from the peers. It is possible that this level of commitment to learning and passion displayed for diversifying one's base of knowledge may serve as the signal of an officer who is prone to think more broadly. Career-based enhancements and rewards, such as the opportunity to assume more challenging and complex assignments, offered consequentially through JPME completion may cloud this potential indicator. In the case of medical staff officers, the current lack of a cause-and-effect relationship between JPME and career progression enables a clearer visualization of an officer's motivation to complete the course of study, unimpeded by officers who complete the course solely as a means to an end.

In 2020, the Navy promulgated changes to the officer performance evaluation system that made for a more concrete organizational commitment to the rewarding of lifelong learning. NAVADMIN 137/20 recommits the Navy to recognizing the strategic imperative of learning, education, and critical thinking in its officer corps, acknowledging the importance of these competencies as equal in value to the kinetic weapons employed in the fleet (Office of the Chief of Naval Operations, 2020). Effective with the release of this message, Reporting Seniors became required to comment on an officer's proficiency in the arena of thinking and learning when completing periodic performance evaluations. Per the missive:

> This requirement will allow us to identify, select and reward those officers who have demonstrated the commitment and ability to learn, as well as those who encourage and support the learning of others, by placing them into positions of influence at the tactical, operational and strategic levels. (Office of the Chief of Naval Operations, 2020, sec. 3)

With the codification of the requirement to document an officer's educational pursuits, to include their JPME coursework, in formal performance evaluation reports, the Navy has now committed itself to rewarding those officers who prioritize learning and who excel while doing so.

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III. LITERATURE REVIEW

The available literature provides scant evidence on the value of broadened learning in the prediction and explanation of medical staff officers' professional performance and career progression. Sources consulted during the preparation of this thesis offered insight on Navy URL officers' promotion probabilities post completion of JPME-I, and the increased promotion probabilities of officers with joint experience after the adoption of the GNA. Additionally, recent research using a subset of United States Marine Corps (USMC) data provided a direct comparison between narrow and broad courses of learning among officers under consideration for selection to O-5 command. While this collective research may not have found a linear correlation between broadened learning and selection for promotion and advanced assignments, there is reason to believe that the experience conferred through such study and experience could be associated with improved performance for those who are placed in those positions of increased complexity.

A 1997 thesis by Daniel Walsh provides the driving impetus to update the current body of knowledge by using a more modern data set, specific to medical staff officers. With his work confined to a subpopulation consisting solely of Navy URL officers, conclusions drawn showed that completion of JPME-I prior to eligibility for the O-5 selection board resulted in no significantly better chance of promotion to O-5. In the specific case of URL officers completing JPME-I through a course of in-residence study after selection to O-5, and before consideration for O-6, these officers had an increased probability of selection to O-6. Unfortunately, this higher rate of selection for promotion was only observed in officers completing JPME-I during a dedicated period of in-residence study and not in those URL officers who completed JPME-I through distance education course offerings (Walsh, 1997).

Walsh's research delved deeper into advanced educational opportunities than those offered within the spectrum of JPME; he also tested the impact of graduate education on URL promotions to O-5 and O-6, as well as the interaction between JPME completion, graduate education, and promotion. In short, he sought to discover whether an optimal sequencing existed for advanced academic and military study that resulted in positive

outcomes for promotion variables. Through data available to him spanning the time period 1986 to 1994, in the immediate aftermath of the GNA, he found that graduate education improved URL officers' probability of selecting for O-5 but that it conferred no benefit if earned after selecting for O-5 and before consideration for O-6. His paper found that the URL officer's career path could be advantaged by pursuing graduate education prior to consideration for O-5 and then completing JPME-I through in-residence study before coming up for O-6 (Walsh, 1997).

Walsh's work provides valuable insight for the completion of JPME-I on career advancement at the dawn of the age of jointness, but it does so in a study population consisting strictly of Navy URL officers. The Navy's medical staff officer corps contain a variety of healthcare specialists, for many of whom graduate education is a foregone conclusion prior to commissioning. Pursuit of further educational opportunities among this subpopulation, to include additional graduate degrees and doctoral work, may shed light on the potential for broadened learning and intrinsic motivation. Unfortunately, such additional advanced studies may not occur on a frequent enough basis to form a sufficient test group for comparison. JPME-I provides a military-specific course of study, relevant to every naval officer regardless of designator, that has achieved a consistent rate of uptake across cohorts so that it may be considered as a proxy variable for a motivated learner. Medical staff officers' backgrounds cover a broad range of military experience prior to their commissioning, as some will have served as enlisted members in the military and others may have completed undergraduate studies at the United States Naval Academy, but all have to voluntarily pursue enrollment in JPME-I. Graduate education may not be a decisive differentiator within the medical community, however the tenacity to complete JPME-I may prove to be a viable signal for talent within this population to a greater extent than Walsh found with the URL population of the late 1980s and early 1990s.

John Kovach's 1996 thesis provides a slightly different look at the intersection of jointness and performance. His research sought to answer questions surrounding how the quality of officers assigned to joint billets changed in the post-GNA Navy, and whether the promotion potential for officers who completed joint tours improved as the system's value of the concept of jointness increased. His research found that the quality of officers

assigned to joint duty, as measured by fitness report data, increased after 1 October 1989. Including data on both performance evaluations and promotion, he also found that joint qualified officers demonstrated higher performance on evaluations and had a positive correlation with promotion to O-5 and O-6 in cohorts after 1 October 1989 (Kovach, 1996). In an example of a virtuous circle, as the Navy placed greater value on joint service and assigned higher quality officers to joint duty, those officers who completed their joint qualification were selected for O-5 and O-6 at a higher rate than their peers. While Kovach's research does not specifically address JPME and gleans its data from line officer communities, its relevance to this paper lies in its demonstration of the Navy's ability to steer high-performing officers into an area of focus, offer career rewards to these officers when they succeed in their assignment, and then attract future high performers into this newly desirable career-enhancing lane.

In his 2021 NPS thesis, Kevin Druffel-Rodriguez researched the effects of service-specific professional military education and non-specific graduate education programs on United States Marine Corps (USMC) officers' propensity to be selected for O-5 command. Using more recent data than the Walsh and Kovach papers, he analyzed command screening board results from FY15 through FY19 to deduce how the USMC has placed value on specialized versus generalized training in recent cohorts of senior officers under consideration for advanced leadership positions. His conclusions illuminated the argument, to a statistically significant degree while controlling for various demographic, professional, and experiential variables, that the USMC has preferentially selected mid-to-senior grade officers with recent occupationally focused military training over those who have participated in broadening educational or fellowship assignments (Druffel-Rodriguez, 2021).

Although the type of education undertaken by these USMC officers impacts the probability of their selection for command, Druffel-Rodriguez additionally ascertains that this prior bifurcation in learning pathways does not contribute significantly to an officer's performance once serving in the command assignment. Notably, he finds that an officer's recent marks on their O-4 personnel evaluations are positively correlated with command tour performance, just as an officer's background in the more generalized professional

specialty of combat service vice the more specialized combat arms and aviation career pathways leads to success in the command assignment (Druffel-Rodriguez, 2021). This timely research among cohorts of USMC officers shows that the service prefers recent specialized courses of study over generalized education when selecting its next generation of leaders, however once they are serving in those command positions, the officer's performance is enhanced when it is built on a foundation of professional experience in a broader, more generalized military occupational specialty. A background in broad thinking is critical to the officer's future success in a leadership billet.

The Military Healthcare System (MHS) and the Navy Medicine enterprise continue to knit themselves together in an environment that requires enhanced interoperability. This research seeks to build on previous warfighter community-focused works so that the value of courses supporting broadened thinking can be ascertained within the Navy's highly specialized cadre of medical staff officers. Each service's medical forces have historically supported the medical readiness and well-being of its own people, but the advent of the era of jointness in the provision of healthcare necessitates medical leaders who think broadly, too. In looking back to ascertain the relative value previously placed on bigger-picture thinkers, we can plan our priorities for the future medical force.

IV. DATA AND METHODS

A. DATA

To answer the research question, this study will employ a quantitative multivariate approach using off-the-shelf personnel data from the Navy's Officer Personnel Information System (OPINS). Five consecutive cohorts of Navy medical staff corps personnel from year groups (YG) 2001 through 2005 were observed annually until 2020 or separation from the Navy. The variables to be utilized fall under two categories: demographic characteristics (gender, race, age, and prior military service) and professional measures (corps, rank, time in grade, date of change in rank, and Additional Qualified Designators (AQD). Analysis of the data will seek to identify and reinforce Navy policies and Navy Medicine practices that align to educate, promote, and advance the highest quality personnel into positions of senior executive leadership.

It is important to note that many medical staff officers do not commission at the grade of O-1 due to previous professional experience and the extended number of years of education that they require to qualify for accession. This aspect is notable within the data set because it creates new entries into the respective cohorts in years beyond the initial start date. For an officer who commissions senior to the grade of O-1, the Navy adjusts the assigned year group to account for the time that the officer would have spent in the Navy had they actually commissioned at O-1. For example, a medical staff officer is commissioned into the Navy in 2010 at the grade of O-3, to recognize their advanced doctoral degree. The Navy then adjusts this officer's year group to 2006 to account for the four years that the individual would have spent in the grades of O-1 and O-2 had they joined without having already attained an advanced level of education. It is rare for a member of the MC or DC to enter active service at a grade below O-3, and they may sometimes enter at O-4 or above. New accessions in the MSC and NC, however, may enter at O-1, O-2, or even O-3.

This research will look for completion of JPME-I though the awarding of the relevant AQD into the officer's personnel record and then compare promotion percentages

between otherwise demographically and professionally comparable officers who had not completed JPME-I at the same stage. To observe this outcome of interest, as well as to seek ceteris paribus within the relevant officer categories in terms of professional accomplishments, it is important to understand the Navy's use of AQDs. An AQD is a three-digit alphanumeric code entered into an officer's record upon successful display of a predetermined professional competency (Department of the Navy, 2022). These codes can be used by system executives, specialty community leaders, and assignment officers to ascertain an officer's preparedness when matching the right person to the right job at the right time. Just as an increasing number of AQDs in an officer's record can imply a greater diversity of professional experience, it can also serve as a signal of an officer committed to personal improvement through broadening assignments, formal education, and on-the-job training.

The data set under study contains up to ten AQD codes per officer and specifies the year in which each AQD was earned. In addition to the information conveyed about completion of JPME-I, this study captures the presence of specified AQDs related to professional achievements germane to the comparison of the subject officers. AQDs used in this study were chosen in part for their ability to be earned by members of any of the four medical staff corps, rather than those AQDs signifying a corps-specific accomplishment. The selected AQDs have been arranged into groups separating those that denote the completion of courses requiring broadened learning and those that signify occupational-specific accomplishments related to operational deployments. Relevant AQDs and the requirements to obtain each have been summarized in Table 2.

Table 2. Relevant AQDs and Their Respective Requirements. Adapted from Department of the Navy, 2022.

AQD	Requirements to earn
JS7	Successfully completed JPME Phase I from schools defined by the Joint Staff
67A	Met all the competencies of the Joint Medical Executive Skills Development Program
67I	Credentialed Health Care Administrator (CHCA)
6FA	Successfully completed a deployment of 90 or more consecutive days with the Marine Corps
6OB	Successfully completed an assignment of 90 or more consecutive days aboard a ship (other than a hospital ship)
6OC	Successfully completed an assignment of 90 or more consecutive days aboard a hospital ship
6OU	Successfully completed an assignment of 90 or more consecutive days at a deployed fleet hospital/Expeditionary Medical Facility
BX2	Qualified as a Fleet Marine Force (FMF) Warfare Officer
LA7	Qualified as a Surface Warfare Medical Department Officer (SWMDO)
J4M J5M J6M U4M U6O J5O	Successfully completed assignment to an Individual Augmentation for a minimum period of 6 months

B. METHODS

The data in this study was analyzed using a statistical software package to assess the significance and magnitude of selected independent variables upon the dependent variables of choice. As the data set consisted of five separate year groups of officers sampled annually over a period of up to 20 years, the first step in the summarization of the data consisted of condensing each year group into one observation per officer for ease of analysis. The OPINS database assigned each officer an identification number, unique to the officer but specific to the year of observation. After removing the first four digits of the identifier that were specific to the year of observation, the remaining digits of the OPINS identification number served as the unique identifier through which the officer's record could be analyzed over the course of time. With a unique identifier in place, each YG of data was respectively condensed down to one record per officer and the observation from the officer's most recent year of service was retained to provide the most complete picture

of the officer's record across the duration of their service. The number of officer records available for study, summarized by YG and corps, is shown in Table 3.

Table 3. Officer Records Under Study, by Corps and Year Group.

	MC	DC	MSC	NC	Total
YG 01	348	81	232	289	950
YG 02	341	88	183	231	843
YG 03	323	114	157	187	781
YG 04	282	97	194	200	773
YG 05	238	106	178	168	690
Total	1,532	486	944	1,075	4,037

To offer the most robust analysis possible of the outcomes of interest, existing variables were standardized for use across the year groups and new variables were generated to create equal comparisons of the data. Demographic and professional variables were chosen for their relevance and availability throughout the majority of the officer observations. A summary of variables given in the data set is provided in Table 4 and the new variables created from available data is shown in Table 5.

Table 4. Independent Variables Given in the Data Set.

Variable	Description
Medical Corps	=1 if Medical Corps officer, =0 otherwise
Dental Corps	=1 if Dental Corps officer, =0 otherwise
Medical Service Corps	=1 if Medical Service Corps officer, =0 otherwise
Nurse Corps	=1 if Nurse Corps officer, =0 otherwise
CAPT	=1 if Current Rank is O-6, =0 otherwise
CDR	=1 if Current Rank is O-5, =0 otherwise
LCDR	=1 if Current Rank is O-4, =0 otherwise
LT	=1 if Current Rank is O-3, =0 otherwise
LTJG	=1 if Current Rank is O-2, =0 otherwise
ENS	=1 if Current Rank is O-1, =0 otherwise
Male	=1 if Gender is Male, =0 otherwise
White	=1 if Race is White, =0 otherwise
Prior Enlisted	=1 if the officer has previous enlisted service, =0 otherwise

Table 5. Independent Variables Created from the Data Set.

Variable	Description
Attrite Year	Fiscal Year of the officer's last known year of service.
JPME-I	=1 if the officer completed JPME-I, =0 otherwise
JPME-I Year	Year in which the officer completed JPME-I, if applicable
Exec Med	=1 if the officer qualified for the 67A AQD, =0 otherwise
Exec Med Year	Year in which the officer obtained the AQD, if applicable
CHCA	=1 if the officer qualified for the 67I AQD, =0 otherwise
CHCA Year	Year in which the officer obtained the AQD, if applicable
USMC Dep	=1 if the officer qualified for the 6FA AQD, =0 otherwise
USMC Dep Year	Year in which the officer obtained the AQD, if applicable
Ship	=1 if the officer qualified for the 6OB AQD, =0 otherwise
Ship Year	Year in which the officer obtained the AQD, if applicable
Hosp Ship	=1 if the officer qualified for the 6OC AQD, =0 otherwise
Hosp Ship Year	Year in which the officer obtained the AQD, if applicable
Fleet Hosp	=1 if the officer qualified for the 6OU AQD, =0 otherwise
Fleet Hosp Year	Year in which the officer obtained the AQD, if applicable
FMF	=1 if the officer qualified for the BX2 AQD, =0 otherwise
FMF Year	Year in which the officer obtained the AQD, if applicable
SWMDO	=1 if the officer qualified for the LA7 AQD, =0 otherwise
SWMDO Year	Year in which the officer obtained the AQD, if applicable
Indiv Aug	=1 if the officer qualified for the J4M, J5M, J6M, U4M, U6O, or J5O AQD, =0 otherwise
Indiv Aug Year	Earliest year in which the officer obtained one of the AQDs, if applicable
Select CAPT	=1 if the officer ever promoted to the rank of O-6, =0 otherwise
Select CDR	=1 if the officer ever promoted to the rank of O-5, =0 otherwise
Select LCDR	=1 if the officer ever promoted to the rank of O-4, =0 otherwise
FY CDR	Fiscal Year in which the officer promoted to the rank of O-5, if applicable
FY LCDR	Fiscal Year in which the officer promoted to the rank of O-4, if applicable
FY LT	Fiscal Year in which the officer promoted to the rank of O-3
Age at CAPT	Age at which the officer promoted to the rank of O-6, if applicable
Age at CDR	Age at which the officer promoted to the rank of O-5, if applicable
Age at LCDR	Age at which the officer promoted to the rank of O-4, if applicable
Age at LT	Age at which the officer promoted to the rank of O-3

After standardization of the given and created variables, additional variables were created to denote the relative career timing of the officer's professional accomplishments. The date of acquisition of the respective AQD was correlated with the officer's rank at the

time of achievement to create the ability to control for an officer's credentials at the time of consideration for subsequent promotion. These new career timing variables are summarized in Table 6. Two additional variables were then created at this stage: one to represent an officer having completed any operational deployment prior to eligibility for O-5 and one for completion of a deployment prior to eligibility for O-4.

Table 6. Control Variables Created to Account for Career Timing.

Variable	Description
JPME-I Before CDR	JPME-I earned prior to eligibility for promotion to the rank of O-5
JPME-I Before LCDR	JPME-I earned prior to eligibility for promotion to the rank of O-4
Exec Med Before CDR	Exec Med earned prior to eligibility for promotion to the rank of O-5
Exec Med Before LCDR	Exec Med earned prior to eligibility for promotion to the rank of O-4
CHCA Before CDR	CHCA earned prior to eligibility for promotion to the rank of O-5
CHCA Before LCDR	CHCA earned prior to eligibility for promotion to the rank of O-4
USMC Dep Before CDR	AQD 6FA earned prior to eligibility for promotion to the rank of O-5
USMC Dep Before LCDR	AQD 6FA earned prior to eligibility for promotion to the rank of O-4
Ship Before CDR	AQD 6OB earned prior to eligibility for promotion to the rank of O-5
Ship Before LCDR	AQD 6OB earned prior to eligibility for promotion to the rank of O-4
Hosp Ship Before CDR	AQD 6OC earned prior to eligibility for promotion to the rank of O-5
Hosp Ship Before LCDR	AQD 6OC earned prior to eligibility for promotion to the rank of O-4
Fleet Hosp Before CDR	AQD 6OU earned prior to eligibility for promotion to the rank of O-5
Fleet Hosp Before LCDR	AQD 6OU earned prior to eligibility for promotion to the rank of O-4
FMF Before CDR	AQD BX2 earned prior to eligibility for promotion to the rank of O-5
FMF Before LCDR	AQD BX2 earned prior to eligibility for promotion to the rank of O-4

Variable	Description
SWMDO Before CDR	AQD LA7 earned prior to eligibility for promotion to the rank of O-5
SWMDO Before LCDR	AQD LA7 earned prior to eligibility for promotion to the rank of O-4
Indiv Aug Before CDR	Indiv Aug completed prior to eligibility for promotion to the rank of O-5
Indiv Aug Before LCDR	Indiv Aug completed prior to eligibility for promotion to the rank of O-4
Deployment Before CDR	=1 if the officer deployed at least once prior to eligibility for promotion to the rank of O-5, =0 otherwise
Deployment Before LCDR	=1 if the officer deployed at least once prior to eligibility for promotion to the rank of O-4, =0 otherwise

Finally, variables needed to be created to estimate the average period of time an officer spent at each rank, as the data set did not contain any indicator signifying the timing of an officer's eligibility for their next promotion. This information is important in the consideration of an officer's accomplishments at the time of consideration for promotion. Although precise information on promotion eligibility is preferable, the calculated estimate enabled by this new variable serves as the best estimate of promotion eligibility. This generated variable is also vital to the ascertainment of record relevance in the calculation of promotion statistics, as it will be used to divide the observations of those officers who left active service prior to consideration for their next promotion from those of officers who remained on active duty and were subsequently not selected for advancement. Table 7 describes these variables related to an officer's flow point from one rank to the next and Table 8 provides a summary of the flow points, averaged by corps over the duration of the five cohorts under study.

Table 7. Variables Used to Calculate Officer Promotion Flow Points.

Variable	Description
Flow Point CDR to CAPT	Number of years between promotion to O-5 and promotion to O-6
Flow Point LCDR to CDR	Number of years between promotion to O-4 and promotion to O-5
Flow Point LT to LCDR	Number of years between promotion to O-3 and promotion to O-4

Table 8. Mean Flow Point in Years, by Rank and Corps.

	MC	DC	MSC	NC	Total
O-5 to O-6	4.5	n/a	5	n/a	4.67
O-4 to O-5	6.11	5.48	6.25	5.99	6.02
O-3 to O-4	5.86	5.78	6.15	5.36	5.81

Based on the information obtained in the flow point analysis, three additional variables were created to enable the consideration of the timing of an officer's expected consideration for promotion. These variables are described in Table 9.

Table 9. Variables Used to Determine Promotion Eligibility Timing.

Variable	Description
Year Eligible for CAPT	Expected year of eligibility for selection to O-6 equals O-5 year of rank plus five
Year Eligible for CDR	Expected year of eligibility for selection to O-5 equals O-4 year of rank plus six
Year Eligible for LCDR	Expected year of eligibility for selection to O-4 equals O-3 year of rank plus six

With the relevant variables defined and standardized, analysis of the impact of JPME-I as an indicator of broadened learning in medical staff officers can begin.

V. RESULTS AND ANALYSIS

A. MEDICAL STAFF OFFICERS COMPLETING JPME-I

In the first manipulation of the data, it is important to visualize the prevalence of officers having completed JPME-I and the stage in their career at which they did so. The percentages derived in this step can help to elucidate the historical pattern of uptake of JPME-I completion within the various medical staff corps and across Navy Medicine as a whole. Later analysis in this thesis will attempt to isolate the marginal effects of this educational achievement, but the baseline completion rates will assist in understanding how common it was for a medical staff officer to have undertaken this particular iteration of broadened learning. Table 10 shows the proportion of medical staff officers who completed JPME-I while in the grade of O-5, Table 11 shows the proportion who completed it while in the grade of O-4, and Table 12 shows the proportion who completed it prior to promotion to O-4. Each table is broken down by corps and separated by year group.

Table 10. Proportion of Officers Completing JPME-I while O-5, by Corps and Year Group

	MC	DC	MSC	NC	Total
YG 01	0.075	0	0.063	0.038	0.058
YG 02	0.019	0.045	0.06	0.051	0.038
YG 03	0.028	0.083	0.028	0	0.029
YG 04	0	0.033	0.036	0.023	0.018
YG 05	0.091	0	n/a[+]	0.04	0.034
Total	0.036	0.033	0.049	0.032	0.037

[+]No MSC officers from YG 05 have yet been eligible for promotion to O-5

Table 11. Proportion of Officers Completing JPME-I while O-4, by Corps and Year Group

	MC	DC	MSC	NC	Total
YG 01	0.011	0.065	0.22	0.014	0.061
YG 02	0.026	0	0.281	0.008	0.069

	MC	DC	MSC	NC	Total
YG 03	0.036	0.034	0.187	0.011	0.058
YG 04	0.022	0	0.177	0.009	0.053
YG 05	0.041	0.069	0.229	0.071	0.095
Total	0.027	0.033	0.219	0.02	0.066

Table 12. Proportion of Officers Completing JPME-I Prior to O-4, by Corps and Year Group

	MC	DC	MSC	NC	Total
YG 01	0	0	0.026	0	0.006
YG 02	0.009	0	0.066	0	0.018
YG 03	0.003	0	0.045	0	0.01
YG 04	0.004	0	0.067	0	0.018
YG 05	0.004	0	0.034	0	0.01
Total	0.004	0	0.047	0	0.012

A cursory review of the data shows that the rate of JPME-I completion is low for officers below O-4, crescendos during an officer's O-4 years, and then abates as members of the cohort advance to O-5. Lower O-5 numbers can be driven, in part, by officers having already completed JPME-I earlier in their careers, combined with the reality that the O-5 officers observed in this data have been recently promoted to this rank and their JPME-I completion rates could be skewed downward as a result of their relatively shorter time in grade. MSC officers led their peers in completion rates within each rank subgroup, most notably at O-4. While this result may reflect each corps' respective focus on specialty-specific training versus joint thinking, factors relating to the within-corps mentorship priorities of senior officers may be influencing the wide disparity seen in these proportions. Holding aside the relatively high JPME-I completion rates of MSC officers in the grade of O-4, we can see that the average proportion of officers who completed a course of JPME-I education does not exceed five percent in year groups 2001 through 2005, regardless of corps or rank.

B. SUBGROUP COMPARISONS ACROSS VARIABLES

The second level of analysis applied to this data is designed to gauge the relative similarity of the subpopulations to be studied. Before trying to correlate the variable of interest, completion of JPME-I, with the outcome variable of promotion, it is important to determine whether or not the comparison groups are statistically similar across the dependent and independent variables being utilized. Noting these statistically significant differences serves to identify independent variables that must be controlled for before further inquiry can be performed with accuracy.

Multiple balance tables have been created to measure the sameness of the planned objects of comparison; statistical dissimilarity in the composition of the comparison groups can lead to a misestimation of the correlation between the chosen variables of interest. Several demographic characteristics, professional credentials, and military operational-related indicators in the sample were compared between the subgroups. The significance of these variables differed among the ranks and corps, with no one balance table allowing for easy summary of a subgroup. Tables 13 through 30 display the respective comparisons between our primary variables of interest: those who were and were not selected for promotion at O-4 and O-5, and those who did and did not complete JPME-I prior to consideration for their next promotion (of those who remained on active duty long enough to be considered). Tables 13 through 17 show the relationships within the groups of medical staff officers who were and were not selected for O-5 and Tables 23 through 27 show the same relationships for those selected and not selected for O-4. Tables 18 through 22 compares the characteristics of medical staff officers who did and did not choose to complete JPME-I prior to eligibility for O-5 and Tables 28 through 30 shows the same comparisons for those officers prior to their eligibility for selection to O-4. For the sake of simplicity, each balance table condenses year groups 2001 through 2005 into one cohort and conveys only the proportion of observations displaying the subject variable. A single star represents a statistically significant difference between subgroups at the 0.05 level.

1. Promotion to O-5

Table 13. Balance Table: O-5 Promotion, All Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before CDR	0.124	0.113	-0.012
Exec Med Before CDR	0.497	0.405	-0.092*
CHCA Before CDR	0.012	0.017	0.006
Prior Enlisted	0.162	0.114	-0.048*
Male	0.616	0.644	0.028
White	0.699	0.762	0.063*
Age at LCDR	37.526	36.018	-1.508*
USMC Dep Before CDR	0.139	0.137	-0.002
Ship Before CDR	0.121	0.131	0.009
Hospital Ship Before CDR	0.090	0.048	-0.041*
Fleet Hospital Before CDR	0.078	0.042	-0.036*
FMF Before CDR	0.202	0.249	0.047
SWMDO Before CDR	0.159	0.186	0.027
Indiv Aug Before CDR	0.327	0.325	-0.002
Observations	346	871	1,217

* $p<0.05$

Table 14. Balance Table: O-5 Promotion, Medical Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before CDR	0.029	0.052	0.024
Exec Med Before CDR	0.309	0.431	0.122*
CHCA Before CDR	0.000	0.000	0.000
Prior Enlisted	0.022	0.002	-0.019*
Male	0.705	0.718	0.013
White	0.719	0.798	0.079
Age at LCDR	35.281	34.506	-0.774*
USMC Dep Before CDR	0.101	0.135	0.034
Ship Before CDR	0.115	0.097	-0.018
Hospital Ship Before CDR	0.022	0.027	0.006
Fleet Hospital Before CDR	0.000	0.010	0.010
FMF Before CDR	0.216	0.254	0.039
SWMDO Before CDR	0.115	0.130	0.015
Indiv Aug Before CDR	0.094	0.187	0.094*
Observations	139	401	540

* $p<0.05$

Table 15. Balance Table: O-5 Promotion, Dental Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before CDR	0.000	0.043	0.043
Exec Med Before CDR	0.333	0.362	0.028
CHCA Before CDR	0.000	0.000	0.000
Prior Enlisted	0.222	0.128	-0.095
Male	0.667	0.681	0.014
White	0.556	0.777	0.221
Age at LCDR	38.667	36.521	-2.145
USMC Dep Before CDR	0.000	0.053	0.053
Ship Before CDR	0.111	0.160	0.048
Hospital Ship Before CDR	0.111	0.000	-0.111*
Fleet Hospital Before CDR	0.000	0.000	0.000
FMF Before CDR	0.556	0.394	-0.162
SWMDO Before CDR	0.333	0.404	0.071
Indiv Aug Before CDR	0.111	0.149	0.038
Observations	9	94	103

* $p<0.05$

Table 16. Balance Table: O-5 Promotion, Medical Service Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before CDR	0.340	0.424	0.084
Exec Med Before CDR	0.757	0.804	0.047
CHCA Before CDR	0.039	0.095	0.056
Prior Enlisted	0.359	0.443	0.084
Male	0.680	0.696	0.017
White	0.728	0.703	-0.026
Age at LCDR	39.146	37.994	-1.152*
USMC Dep Before CDR	0.204	0.259	0.056
Ship Before CDR	0.184	0.297	0.113*
Hospital Ship Before CDR	0.146	0.108	-0.038
Fleet Hospital Before CDR	0.049	0.063	0.015
FMF Before CDR	0.214	0.342	0.128*
SWMDO Before CDR	0.272	0.361	0.089
Indiv Aug Before CDR	0.427	0.443	0.016
Observations	103	158	261

* $p<0.05$

Table 17. Balance Table: O-5 Promotion, Nurse Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before CDR	0.042	0.028	-0.015
Exec Med Before CDR	0.505	0.087	-0.418*
CHCA Before CDR	0.000	0.000	0.000
Prior Enlisted	0.147	0.073	-0.074*
Male	0.411	0.454	0.044
White	0.653	0.734	0.081
Age at LCDR	38.947	37.151	-1.796*
USMC Dep Before CDR	0.137	0.087	-0.050
Ship Before CDR	0.063	0.060	-0.004
Hospital Ship Before CDR	0.126	0.064	-0.062
Fleet Hospital Before CDR	0.232	0.106	-0.126*
FMF Before CDR	0.137	0.110	-0.027
SWMDO Before CDR	0.084	0.069	-0.015
Indiv Aug Before CDR	0.579	0.569	-0.010
Observations	95	218	313

* $p<0.05$

2. JPME-I Completion Prior to Consideration for Promotion to O-5

Table 18. Balance Table: JPME-I Completion Prior to O-5, All Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before CDR	0.378	0.837	0.459*
CHCA Before CDR	0.007	0.085	0.079*
Prior Enlisted	0.115	0.220	0.105*
Male	0.630	0.681	0.051
White	0.744	0.745	0.000
Age at LCDR	36.363	37.085	0.722
USMC Dep Before CDR	0.114	0.312	0.198*
Ship Before CDR	0.118	0.206	0.088*
Hospital Ship Before CDR	0.055	0.099	0.044*
Fleet Hospital Before CDR	0.054	0.043	-0.011
FMF Before CDR	0.217	0.376	0.158*
SWMDO Before CDR	0.166	0.270	0.103*
Indiv Aug Before CDR	0.329	0.298	-0.031
Observations	1,076	141	1,217

* $p<0.05$

Table 19. Balance Table: JPME-I Completion Prior to O-5, Medical Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before CDR	0.377	0.880	0.503*
CHCA Before CDR	0.000	0.000	0.000
Prior Enlisted	0.006	0.040	0.034
Male	0.713	0.760	0.047
White	0.775	0.840	0.065
Age at LCDR	34.720	34.400	-0.320
USMC Dep Before CDR	0.117	0.320	0.203*
Ship Before CDR	0.091	0.320	0.229*
Hospital Ship Before CDR	0.027	0.000	-0.027
Fleet Hospital Before CDR	0.008	0.000	-0.008
FMF Before CDR	0.231	0.520	0.289*
SWMDO Before CDR	0.118	0.280	0.162*
Indiv Aug Before CDR	0.163	0.160	-0.003
Observations	515	25	540

* $p<0.05$

Table 20. Balance Table: JPME-I Completion Prior to O-5, Dental Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before CDR	0.343	0.750	0.407
CHCA Before CDR	0.000	0.000	0.000
Prior Enlisted	0.141	0.000	-0.141
Male	0.677	0.750	0.073
White	0.747	1.000	0.253
Age at LCDR	36.818	34.000	-2.818
USMC Dep Before CDR	0.051	0.000	-0.051
Ship Before CDR	0.162	0.000	-0.162
Hospital Ship Before CDR	0.010	0.000	-0.010
Fleet Hospital Before CDR	0.000	0.000	0.000
FMF Before CDR	0.414	0.250	-0.164
SWMDO Before CDR	0.394	0.500	0.106
Indiv Aug Before CDR	0.152	0.000	-0.152
Observations	99	4	103

* $p<0.05$

Table 21. Balance Table: JPME-I Completion Prior to O-5, Medical Service Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before CDR	0.730	0.873	0.143*
CHCA Before CDR	0.044	0.118	0.074*
Prior Enlisted	0.484	0.294	-0.190*
Male	0.698	0.676	-0.022
White	0.717	0.706	-0.011
Age at LCDR	38.736	38.000	-0.736
USMC Dep Before CDR	0.189	0.314	0.125*
Ship Before CDR	0.296	0.186	-0.109*
Hospital Ship Before CDR	0.119	0.127	0.008
Fleet Hospital Before CDR	0.069	0.039	-0.030
FMF Before CDR	0.252	0.353	0.101
SWMDO Before CDR	0.358	0.275	-0.084
Indiv Aug Before CDR	0.522	0.304	-0.218*
Observations	159	102	261

* $p<0.05$

Table 22. Balance Table: JPME-I Completion Prior to O-5, Nurse Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before CDR	0.208	0.400	0.192
CHCA Before CDR	0.000	0.000	0.000
Prior Enlisted	0.099	0.000	-0.099
Male	0.439	0.500	0.061
White	0.706	0.800	0.094
Age at LCDR	37.762	35.700	-2.062
USMC Dep Before CDR	0.092	0.400	0.308*
Ship Before CDR	0.056	0.200	0.144
Hospital Ship Before CDR	0.083	0.100	0.017
Fleet Hospital Before CDR	0.142	0.200	0.058
FMF Before CDR	0.112	0.300	0.188
SWMDO Before CDR	0.073	0.100	0.027
Indiv Aug Before CDR	0.568	0.700	0.132
Observations	303	10	313

* $p<0.05$

3. Promotion to O-4

Table 23. Balance Table: Promotion to O-4, All Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before LCDR	0.030	0.017	-0.013
Exec Med Before LCDR	0.215	0.062	-0.153*
CHCA Before LCDR	0.037	0.013	-0.024*
Prior Enlisted	0.296	0.165	-0.132*
Male	0.630	0.639	0.010
White	0.726	0.735	0.009
Age at LT	33.593	30.493	-3.100*
USMC Dep Before LCDR	0.081	0.060	-0.021
Ship Before LCDR	0.089	0.054	-0.035
Hospital Ship Before LCDR	0.081	0.012	-0.069*
Fleet Hospital Before LCDR	0.052	0.009	-0.043*
FMF Before LCDR	0.133	0.103	-0.030
SWMDO Before LCDR	0.133	0.109	-0.024
Indiv Aug Before LCDR	0.393	0.201	-0.191*
Observations	135	2,375	2,510

* $p<0.05$

Table 24. Balance Table: Promotion to O-4, Medical Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before LCDR	0.000	0.003	0.003
Exec Med Before LCDR	0.048	0.001	-0.047*
CHCA Before LCDR	0.000	0.000	0.000
Prior Enlisted	0.048	0.014	-0.034
Male	0.667	0.657	-0.009
White	0.762	0.762	0.001
Age at LT	28.429	28.170	-0.258
USMC Dep Before LCDR	0.000	0.044	0.044
Ship Before LCDR	0.048	0.024	-0.024
Hospital Ship Before LCDR	0.000	0.001	0.001
Fleet Hospital Before LCDR	0.000	0.002	0.002
FMF Before LCDR	0.000	0.085	0.085
SWMDO Before LCDR	0.095	0.063	-0.032
Indiv Aug Before LCDR	0.095	0.063	-0.032
Observations	21	1,103	1,124

* $p<0.05$

Table 25. Balance Table: Promotion to O-4, Dental Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before LCDR	0.000	0.000	0.000
Exec Med Before LCDR	0.000	0.000	0.000
CHCA Before LCDR	0.000	0.000	0.000
Prior Enlisted	0.333	0.223	-0.111
Male	0.667	0.744	0.077
White	0.667	0.735	0.068
Age at LT	33.667	29.365	-4.302
USMC Dep Before LCDR	0.000	0.028	0.028
Ship Before LCDR	0.000	0.052	0.052
Hospital Ship Before LCDR	0.000	0.000	0.000
Fleet Hospital Before LCDR	0.000	0.000	0.000
FMF Before LCDR	0.000	0.204	0.204
SWMDO Before LCDR	0.000	0.242	0.242
Indiv Aug Before LCDR	0.000	0.085	0.085
Observations	3	211	214

* $p<0.05$

Table 26. Balance Table: Promotion to O-4, Medical Service Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before LCDR	0.048	0.069	0.022
Exec Med Before LCDR	0.333	0.273	-0.060
CHCA Before LCDR	0.060	0.056	-0.003
Prior Enlisted	0.429	0.493	0.065
Male	0.679	0.712	0.034
White	0.726	0.718	-0.008
Age at LT	34.155	32.609	-1.545*
USMC Dep Before LCDR	0.107	0.163	0.055
Ship Before LCDR	0.107	0.166	0.059
Hospital Ship Before LCDR	0.048	0.050	0.003
Fleet Hospital Before LCDR	0.048	0.028	-0.020
FMF Before LCDR	0.202	0.202	-0.001
SWMDO Before LCDR	0.179	0.258	0.079
Indiv Aug Before LCDR	0.488	0.394	-0.094
Observations	84	535	619

* $p<0.05$

Table 27. Balance Table: Promotion to O-4, Nurse Corps

Variable	Non-Selected	Selected	Difference
JPME-I Before LCDR	0.000	0.000	0.000
Exec Med Before LCDR	0.000	0.000	0.000
CHCA Before LCDR	0.000	0.000	0.000
Prior Enlisted	0.074	0.124	0.050
Male	0.444	0.485	0.040
White	0.704	0.694	-0.010
Age at LT	35.852	33.662	-2.190*
USMC Dep Before LCDR	0.074	0.002	-0.072*
Ship Before LCDR	0.074	0.004	-0.070*
Hospital Ship Before LCDR	0.259	0.002	-0.257*
Fleet Hospital Before LCDR	0.111	0.010	-0.102*
FMF Before LCDR	0.037	0.000	-0.037*
SWMDO Before LCDR	0.037	0.000	-0.037*
Indiv Aug Before LCDR	0.370	0.340	-0.030
Observations	27	526	553

* $p<0.05$

4. JPME-I Completion Prior to Consideration for Promotion to O-4

Of note, the Dental Corps and Nurse Corps across year groups 2001 through 2005 had zero officers complete JPME-I while serving in the grade of O-3. Balance tables for these two corps can therefore not be constructed.

Table 28. Balance Table: JPME-I Completion Prior to O-4, All Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before LCDR	0.063	0.455	0.391*
CHCA Before LCDR	0.012	0.114	0.101*
Prior Enlisted	0.168	0.364	0.195*
Male	0.637	0.750	0.113
White	0.735	0.682	-0.053
Age at LT	30.633	32.136	1.503*
USMC Dep Before LCDR	0.059	0.205	0.146*
Ship Before LCDR	0.053	0.205	0.151*
Hospital Ship Before LCDR	0.015	0.068	0.053*
Fleet Hospital Before LCDR	0.011	0.068	0.058*
FMF Before LCDR	0.104	0.159	0.055
SWMDO Before LCDR	0.108	0.227	0.119*

Variable	No JPME-I	JPME-I	Difference
Indiv Aug Before LCDR	0.210	0.273	0.062
Observations	2,466	44	2,510

* p<0.05

Table 29. Balance Table: JPME-I Completion Prior to O-4, Medical Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before LCDR	0.002	0.000	-0.002
CHCA Before LCDR	0.000	0.000	0.000
Prior Enlisted	0.013	0.333	0.320*
Male	0.657	1.000	0.343
White	0.764	0.000	-0.764*
Age at LT	28.169	30.333	2.164
USMC Dep Before LCDR	0.043	0.333	0.291*
Ship Before LCDR	0.024	0.000	-0.024
Hospital Ship Before LCDR	0.001	0.000	-0.001
Fleet Hospital Before LCDR	0.002	0.000	-0.002
FMF Before LCDR	0.084	0.000	-0.084
SWMDO Before LCDR	0.064	0.000	-0.064
Indiv Aug Before LCDR	0.064	0.000	-0.064
Observations	1,121	3	1,124

* p<0.05

Table 30. Balance Table: JPME-I Completion Prior to O-4, Medical Service Corps

Variable	No JPME-I	JPME-I	Difference
Exec Med Before LCDR	0.266	0.488	0.221*
CHCA Before LCDR	0.052	0.122	0.070
Prior Enlisted	0.493	0.366	-0.127
Male	0.706	0.732	0.026
White	0.718	0.732	0.014
Age at LT	32.858	32.268	-0.590
USMC Dep Before LCDR	0.152	0.195	0.043
Ship Before LCDR	0.154	0.220	0.066
Hospital Ship Before LCDR	0.048	0.073	0.025
Fleet Hospital Before LCDR	0.028	0.073	0.045
FMF Before LCDR	0.204	0.171	-0.033
SWMDO Before LCDR	0.247	0.244	-0.004
Indiv Aug Before LCDR	0.415	0.293	-0.123
Observations	578	41	619

* p<0.05

5. Discussion

Of initial interest from these results is the consistent presence of parity between the promoted and unpromoted groups concerning the completion of JPME-I prior to consideration for selection. In the data on promotions to both O-4 and O-5, selected and non-selected groups each contain a proportion of officers who have completed JPME-I prior to selection eligibility that does not significantly differ between the two subgroups. This result holds true for each individual medical staff corps' results, as well as the aggregated results of Navy Medicine as a whole. Although not a definitive result, it is an interesting first slice of the independent variable of interest to see that a statistically similar proportion of officers who have completed JPME-I can be found among those who have selected for promotion, compared to those who have not.

A second focus of comparison exists in the demographic variables chosen for analysis in this sample. In each balancing of subgroups, gender proportion is found to be statistically similar on each side of the equation for both promotion assessments and among those who have completed JPME-I. Racial diversity is also found to be statistically similar in all comparisons, except in the subgroups compared for promotion to O-5 across all of Navy Medicine. An officer's age at the time of promotion to O-4 was found to be statistically different between selects and non-selects for O-5, but no significant difference in age was observed in the proportions of selects and non-selects who chose to undertake JPME-I before being considered for O-5. Differences in an officer's age at the time of promotion to O-3 showed less consistent significance in the proportion of officers completing JPME-I prior to being considered for selection for O-4.

The third item for analysis from this run of balance tables concerns the larger topic of broad thinkers and the question of their propensity for success within the Navy Medicine enterprise. In Table 18 and Table 28, respectively the Navy Medicine-wide comparisons of officers who had completed JPME-I prior to consideration for O-5 and O-4, we see that the groups are significantly different in many of the professional credential and operational experience categories of independent variables. In any measure where the two comparison groups are significantly different, we see that the subgroup that had previously completed JPME-I contains a higher proportion of officers that possesses the independent variable in

question. Whether through a box-checking mentality, a consistency in the zealous pursuit of senior mentors' career recommendations, or a genuine interest in building a broadened skillset through diverse education and experiences, the data in these two tables show that the completion of JPME-I was pursued by those same officers who recognized the wide panoply of broadening opportunities that the Navy encourages through the awarding of an AQD upon attainment of the credential.

The results from each individual medical staff corps vary slightly, as their respective career paths differ by the exact tasks and billets that the Navy requires the officers to undertake. Where statistical significance between two subgroups may be shown, there also exists the caveat that the economic significance may be questionable when the cohort's absolute numbers are small. It is difficult to widely apply the results of JPME-I completion in Medical Corps officers prior to promotion to O-4, when only three of 1,124 officers had completed JPME-I prior to consideration for promotion. Aggregating the data across the four medical staff corps that comprise Navy Medicine may dull the precision that is obtained when a corps is observed on its own, but it enables the power of the larger enterprise to be visualized for its ability to create and reward medical leaders who think broadly.

C. REGRESSION ANALYSIS

Although selection for promotion is only one indicator of the level of an officer's performance relative to their peers, it is used in this thesis as an aggregated marker of overall professional success. Not all officers are motivated to seek promotion, as some may be content in their present role within the organization, and others could possibly be considering near-term attrition to leave the Navy and pursue new career opportunities. This thesis will attempt to control for this unknown motivation to pursue promotion that exists within each officer by removing from the analysis those officers who attrite prior to eligibility for their next promotion. Selection for promotion to the next paygrade is not the perfect catchall to gauge discernible differences in high performing officers. It serves as a broad instrument in the attempt to measure a very nuanced and multifactorial outcome. Nevertheless, career-minded officers are likely to have rank advancement as one of their

goals and its usage as the outcome variable in this study is suitable as a proxy to ascertain a medical staff officer's caliber of total performance over time.

1. Linear Probability Model

To measure the marginal impact of the various independent variables chosen for study on the outcome variable of promotion, the Linear Probability Model (LPM) has been selected for employment. Simple in interpretation and well-designed to analyze a binary outcome variable, the LPM offers the utility of visualizing the effect of a one-unit increase in a given input variable, while holding all other independent variables constant, on the marginal change in probability that we observe a success in the outcome variable (Wooldridge, 2017). In choosing to measure an officer's performance through the simple binary outcome variable of promoted versus not promoted, the LPM provides a straightforward path to analyze the marginal impact estimated to exist between each chosen independent variable and the probability of promotion.

By controlling for numerous demographic, professional, and operational deployment-related variables, we are better able to predict the significance of the JPME-I completion variable on the probability of promotion. Additionally, the inclusion of indicator variables for corps and year group allows for fixed effects surrounding the variation within these defined clusters to be accounted for when attempting to estimate JPME-I's impact with the greatest level of precision. Each corps and year group will have peculiarities unique unto itself that we can expect to vary within each cluster but not across them. It is valuable to attempt to control for these cluster-specific influences that may cloud the interpretation of the variables of interest. Adding stepped progressions of controls to the models serves to allow analysis of each variable's significance upon the outcome of interest as new groupings of variables are added, with an end goal of finding the optimal combination of independent variables to explain as much as possible about the estimated change in the outcome variable. Figure 1 shows the general LPM model and Figure 2 conveys the LPM model utilized in this thesis, as separately applied to the probabilities of promotion to O-5 and O-4.

$$y = \beta_0 + \beta_1 x_{it1} + \beta_2 x_{it2} + \ldots + \beta_k x_{itk} + \alpha_i + \delta_t + u_{it}$$

Figure 1. The Linear Probability Model with Fixed Effects. Source: Wooldridge (2017).

$$P(Promotion)_{it} = \beta_0 + \beta_1 * JPME\text{-}I_{it} + \beta_2 * Exec\ Med_{it} + \beta_3 * CHCA_{it} + \beta_4 * Combined\ Credentials_{it} + \beta_5 * Prior\ Enlisted_{it} + \beta_6 * Male_{it} + \beta_7 * White_{it} + \beta_8 * Age_{it} + \beta_9 * Deployment_{it} + \alpha_i + \delta_t + u_{it}$$

Figure 2. LPM, as Applied to Subject Research Question

The analysis begins with an assessment of learning and broadening opportunities on promotion, unfettered by control variables, then proceeds to add demographic and deployment-related controls, and the previously referenced fixed effects are then added into the equation. The series of regressions concludes with an investigation into the significance of combining multiple educational course completions into one variable for measurement of its predicted association with the probability of promotion. Figure 3 shows the results of the LPM conducted for Navy medical staff officers' probability of selection for promotion to O-5 and Figure 5 shows the results for the probability of selection for promotion to O-4.

2. Probability of Promotion to O-5

	(1) JPME-I & Credentials	(2) Demographic & Operational Controls	(3) Corps & YG Fixed Effects	(4) Combined Credentials
JPME-I Before CDR	0.005	0.011	0.072	
	(0.917)	(0.798)	(0.120)	
Exec Med Before CDR	-0.081*	-0.088*	-0.044	
	(0.004)	(0.002)	(0.131)	
CHCA Before CDR	0.115	0.153	0.156	
	(0.245)	(0.126)	(0.120)	
JPME-I/Exec Med/CHCA Before CDR				0.277*
				(0.001)
Prior Enlisted		-0.033	0.050	0.037
		(0.461)	(0.313)	(0.451)
Male		0.037	0.023	0.022
		(0.173)	(0.398)	(0.411)
White		0.052	0.053	0.056

	(1) JPME-I & Credentials	(2) Demographic & Operational Controls	(3) Corps & YG Fixed Effects	(4) Combined Credentials
		(0.086)	(0.073)	(0.060)
Age at LCDR		-0.015*	-0.015*	-0.014*
		(0.000)	(0.000)	(0.000)
Deployment Before CDR		0.040	0.043	0.039
		(0.134)	(0.102)	(0.132)
R^2	0.008	0.038	0.086	0.084
Observations	1,217	1,217	1,217	1,217

p-values in parentheses
* p<0.05

Figure 3. Estimated Marginal Effects of JPME-I Completion on Medical Staff Officer Promotion to O-5

This regression displays the estimated marginal effects of several independent variables on the probability of promotion to O-5 for 1,217 medical staff officers in year groups 2001-2005. The interpretation of each coefficient involves multiplying the result by 100 to obtain the percentage point change in the probability of promotion, compared to the likelihood of promotion in the comparison group. Each independent variable, other than age, is formatted as a binary construct, therefore the coefficient on these variables represents the percentage point change in the probability of promotion in the presence of the subject variable, as compared to an officer who lacks the variable characteristic. The statistical significance of each variable is denoted with a single star, indicating that the 95 percent confidence interval does not contain the value zero and that we can be reasonably assured of the variable's relevance to the outcome variable at the 0.05 level.

The first model was designed to measure the estimated correlation between broadening credentials and the probability of promotion to O-5. In addition to JPME-I, achievement of the Executive Medicine credential and the attainment of Credentialed Health Care Administrator status were studied for their independent impact on the predictions. While each of these additional credentials is healthcare-specific, contrary to the broad military focus of JPME-I, they each represent a multiyear commitment to learning outside the scope of one's narrow area of specialty. The Exec Med and CHCA credentials cannot be earned quickly and are available to be achieved by any member of

the four corps within Navy Medicine. For this reason, I sought to ascertain their individual association with the predicted probability of promotion to O-5.

The results of this first model show that neither the completion of JPME-I nor CHCA has a significant correlation with promotion to O-5. However, achievement of the Executive Medicine credential correlates with a statistically significant 8.1 percentage point decrease in the estimated probability of promotion. Selection board members recognize this credential's impact and seemingly weight it against an officer's potential to capably serve at the next higher paygrade. The relevance of this model in measuring the degree to which these variables bear on the outcome variable is quite low, as measured by an R-squared value of 0.008 on a scale from zero to one. These three variables alone do not explain much about the predicted change in probability of a medical staff officer being promoted to O-5.

In the second regression, demographic and operational deployment-related variables are added to the regression to control for their influence on promotion probability. Isolating for gender, race, age, previous enlisted experience, and a history of at least one operational deployment prior to consideration for promotion helps to sharpen the focus on our main variable of interest, completion of JPME-I. Due to the variation seen across Navy Medicine and its four corps in the incidence of different types of operational deployments undertaken among selects and non-selects for O-5, as seen in the balance tables shown in Tables 13-17, it was decided to generate a variable to represent the completion of any type of deployment prior to consideration for promotion. While all deployments are not created equal, the presence or absence of an operational assignment in an officer's record is an important career variable to control for when measuring the predicted influence of the learning-related independent variables.

As in the first model, we see no significant correlation between JPME-I or CHCA and the estimated probability of promotion, and a statistically significant negative influence by the achievement of the Executive Medicine credential. The newly added variables are also not statistically significant, except for an officer's age at the time of promoting to the current rank of LCDR. Each additional year of age at the time of promotion to O-4 is correlated with a 1.5 percentage point decrease in the predicted probability of promotion

to O-5. Of note, the variable for age was supplemented with the addition of a quadratic term in unseen test regressions in order to visualize whether age is best interpreted as having a linear impact on the probability of promotion. Squaring the age term brought the subsequent model no additional explanatory power on the outcome variable, therefore the effect of age on promotion can be interpreted as not accelerating or decelerating with regard to an officer's absolute age in years. This combined set of variables also explains very little about the change in promotion probability, with a reported R-squared value of 0.038.

The third model includes the same set of variables as in the second model, but it has been endowed with the added constraints of fixed effects for corps and year group. The members of each corps and each year group are afflicted by unseen influences that cannot be measured through simple regression. The career paths and opportunities to excel differ slightly between the Medical Corps and the Dental Corps, the Dental Corps and the Nurse Corps, and so on. National and global developments have varied between those who entered Navy Medicine in year group 2001 versus those who are members of year group 2004. We cannot accurately regress on these time and group intricacies, but we can control for them in this third model in order to sharpen the precision of the estimates that we generate on the existing measurable independent variables. After controlling for fixed effects in the third model, we see that all variables show no significant correlation with the predicted probability of promotion, except for age at time of promotion to O-4 which retains its inverse relationship with the predicted probability of promotion to O-5. The addition of fixed effects to the model now more than doubles the value of the R-squared to 0.086.

Having progressed through these iterations of regressions and been unable to isolate a significant relationship between the completion of JPME-I and the estimated probability of promotion to O-5, I decided to expand upon the data shown in Table 18 to investigate whether a combination of credentials could be associated with a change in the outcome variable. Table 18 shows that medical staff officers who completed JPME-I prior to consideration for promotion to O-5 had a much higher incidence of achievement of the Exec Med and CHCA credentials than those officers who had not completed JPME-I. Armed with this insight, I created a variable equal to one if an officer had completed all three opportunities for advanced study and system-wide thinking prior to being considered for promotion.

The fourth model summarizes the correlation between this variable for combined credentials and the predicted probability of promotion, and it is significant. For a medical staff officer who earns the completion of JPME-I, Exec Med, and CHCA prior to being considered for promotion to O-5, the estimated probability of promotion increases by 27.7 percentage points, compared to an officer who has not completed all three of these courses of study. Age retains its steadily negative correlation with promotion probability and this model explains essentially the same amount of variability in the change in the outcome variable as the third model does. While the achievement of JPME-I alone showed no correlation with a change in the predicted probability of promotion to O-5 throughout the series of regressions, its combination with similar Navy-endorsed courses of personal improvement and big-picture thinking resulted in a significant and powerful change in the estimated probability of achieving a success in the outcome variable. Figure 4 shows this juxtaposition between the learning variables on predicted promotion probability, both alone and when combined, with the point estimate of the coefficients and the 95 percent confidence intervals for each independent variable from models three and four displayed.

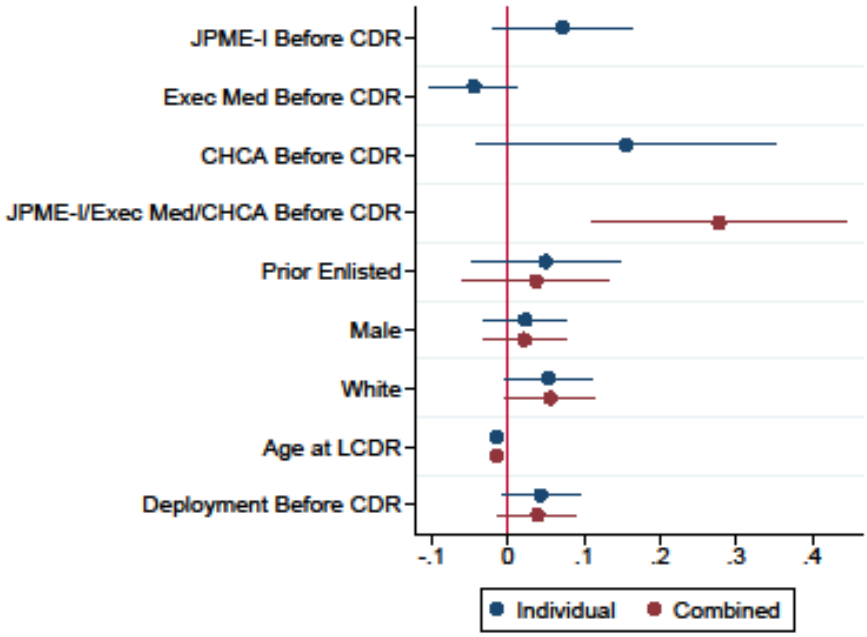

Figure 4. Significance of Each Independent Variable on the Estimated Probability of Promotion to O-5

3. Probability of Promotion to O-4

	(1) JPME-I & Credentials	(2) Demographic & Operational Controls	(3) Corps & YG Fixed Effects	(4) Combined Credentials
JPME-I Before LCDR	0.010	0.011	0.050	
	(0.833)	(0.799)	(0.269)	
Exec Med Before LCDR	-0.119*	-0.095*	-0.047	
	(0.000)	(0.003)	(0.166)	
CHCA Before LCDR	-0.007	0.002	0.011	
	(0.916)	(0.980)	(0.858)	
JPME-I/Exec Med/CHCA Before LCDR				0.135*
				(0.000)
Prior Enlisted		-0.001	0.034	0.030
		(0.934)	(0.063)	(0.092)
Male		0.011	0.011	0.011
		(0.217)	(0.222)	(0.238)
White		-0.004	-0.005	-0.006
		(0.724)	(0.601)	(0.563)
Age at LT		-0.006*	-0.005*	-0.005*
		(0.000)	(0.000)	(0.000)
Deployment Before LCDR		-0.022*	-0.005	-0.007
		(0.036)	(0.640)	(0.525)
R^2	0.018	0.037	0.060	0.058
Observations	2,510	2,510	2,510	2,510

p-values in parentheses
* p<0.05

Figure 5. Estimated Marginal Effects of JPME-I Completion on Medical Staff Officer Promotion to O-4

The analysis of the models derived to consider the impact of JPME-I completion on a medical staff officer's estimated probability of promotion to O-4 proceeds in nearly identical fashion to that of O-5, albeit with varying magnitudes. In this series of regressions, 2,510 medical staff officers from year groups 2001-2005 were considered for promotion to the grade of O-4. The first three models each show no significant correlation between JPME-I completion or the earning of the CHCA credential and the predicted probability of promotion. As in the analysis of promotion to O-5, there still exists a significantly negative correlation between the achievement of the Exec Med credential and the estimated promotion probability until the inclusion of fixed effects for corps and year group. Once included, the independent variable for age at the time of the officer's promotion to O-3 shows a significant and inverse relationship with the estimated probability of promotion to

O-4. New to this analysis is a significant correlation between an officer having deployed at least once and the predicted probability of subsequent promotion to O-4. This 2.2 percentage point reduction in predicted promotion probability occurred in the second model and was rendered insignificant by the third model with its inclusion of fixed effects.

The combination of the three learning credentials under consideration, JPME-I, Exec Med, and CHCA, was correlated with a significant 13.5 percentage point increase in the estimated probability of promotion to O-4. While the achievement of three such difficult and broadly focused credentials would most likely be a rare feat by a junior officer, those that were able to do so saw a statistically significant increase in their predicted probability of promotion. Furthermore, as these credentials are each earned once per career and remain in the officer's record in perpetuity, these same officers who enhanced their predicted probability of advancing to O-4 will also benefit from the advantage conveyed if they choose to remain on active duty long enough to be considered for promotion to O-5. Figure 6 enables the visualization of coefficient point estimates and 95 percent confidence intervals for these variables and their correlation with the predicted probability of promotion to O-4.

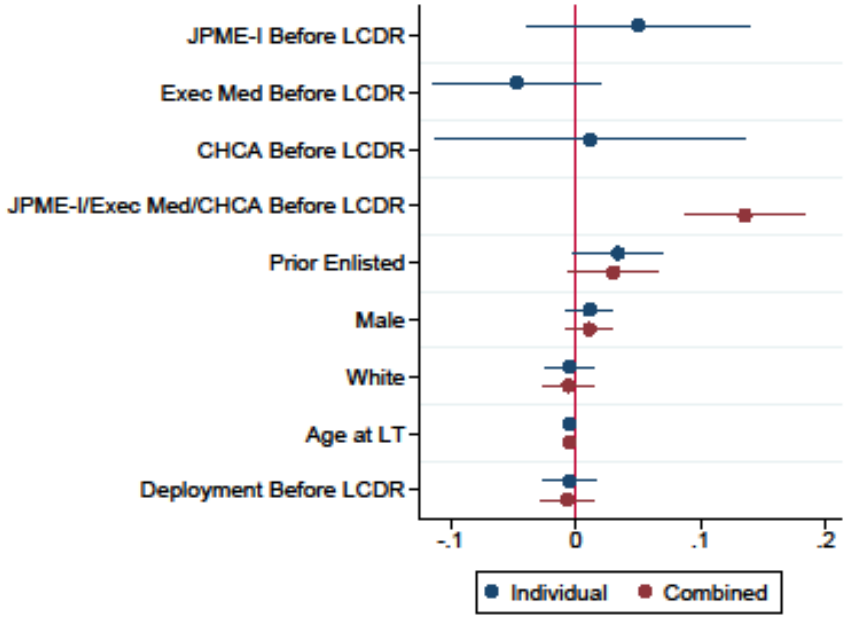

Figure 6. Significance of Each Independent Variable on the Estimated Probability of Promotion to O-4

Just as in the visualization of regression coefficients for the estimated probability of promotion to O-5 displayed in Figure 4, we see in Figure 6 that the demographic and operational deployment-related control variables have coefficient point estimates near zero and relatively narrow confidence intervals. Where this confidence interval includes the value of zero, we can be statistically assured that the variable had no correlation with the predicted probability of promotion in this population of medical staff officers. As we turn to the three independent variables associated with learning and an officer's motivation to pursue courses of study on thinking broadly, we can see that each has a wide confidence interval and shows no significant correlation with the predicted probability of promotion once controls and fixed effects are added to the regression. Only in combination do these markers of big-picture thinking and systemic problem solving create a statistically significant effect on the estimated probability of promotion for medical staff officers.

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VI. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

In viewing the research question through its narrowest interpretation, this study shows that a medical staff officer's completion of JPME-I resulted in no significant increase or decrease in the estimated probability of promotion to O-4 or O-5. Regression analysis of officer personnel records from year groups 2001 through 2005 revealed no correlation between this educational achievement and promotion, used as an all-encompassing indicator of positive performance, even after controlling for various demographic, professional, and time-based characteristics of the study population. The advent of the DHA and the era of jointness in the delivery of military medical services has altered the environment in which many medical staff officers operate, but it does not seem as though JPME is being fully harnessed as a vehicle through which interservice relationships and capabilities are being strengthened. Relatively low rates of completion of JPME-I across Navy Medicine's ranks and corps, other than MSC officers in the grade of O-4 who have comparatively much higher rates, and a lack of promotion selection board recognition of the achievement renders it an underutilized tool for the dissemination of joint theories and doctrine within the Navy Medicine community.

A larger theory of medical staff officer performance enhancement through the pursuit of broadened learning opportunities was shown to have a statistically significant impact within the population under study. An officer who pursued and completed multiple courses of educational enrichment to widen their professional acumen could indeed expect to significantly increase their probability of promotion to both the O-4 and O-5 paygrades. Although the development of range within medical staff officers can occur through a myriad of permutations, an officer's quest to broaden their scope beyond the confines of their specialty was positively correlated with those intrinsic and unseen factors that led to selection for promotion. The degree to which an officer can be identified as a specialist or a generalist is not easy to quantify and can shift in an individual depending on the day and the assignment, but the combination of military and healthcare learning opportunities that was correlated with a greatly enhanced potential for promotion shows that the heterogenous

amalgamation made the officers better candidates for larger and more complex future assignments.

The completion of JPME-I, attainment of Credentialed Health Care Administrator status, and qualification for the Executive Medicine AQD enables up-and-coming junior officers to engage with peers and expand their understanding of the enterprise in which they serve while undertaking these courses of study. To earn this mix of credentials, a blend of learning and doing is required. A combination of rote memorization of new concepts and interplay with other skilled individuals forces the officer to expand their horizons and believe that their comprehensive capacity is unlimited. More than enabling future fact regurgitation, these formative experiences enable the officer to develop their own increased level of competence and to learn how to learn (Barrett, 2012). Completion of JPME-I may not currently be independently correlated with a level of performance synonymous with promotion to the next higher paygrade, but in combination with other broadening courses of education it does serve as a signal for an officer who is committed to viewing the enterprise as an interwoven system. These officers have then been judged by promotion selection boards to be ready for promotion into positions requiring leaders who can solve the organization's most pressing and complex problems.

B. LIMITATIONS

The rich and robust data set under study allowed for the continuous observation of five cohorts of officers annually over the course of 20 years. Although a conscious choice was made to maintain the simplicity of the independent variables to provide an analysis of the research question at a basic level, the addition of officers' corresponding performance evaluation reports from throughout the time period under study would provide a treasure trove of additional insight. Each of the models in the regressions suffered from a relative lack of explanatory power, likely due in part to the absence of relevant fitness report data on each of the officers. Sustained, superior performance in an officer's assigned duties remains the oft-quoted mantra from seniors to juniors on how to advance in rank and responsibility. Although the obtained results are informative, inclusion of fitness report trait grades and promotion recommendations would greatly increase the applicability and

relevance of this study's results, should the correlations continue to hold after the inclusion of this data.

Studying the officers of year groups 2001-2005 does provide upward of 20 years of career achievements to analyze, however the members of these groups are only just beginning to come under consideration for promotion to O-6. Executive leadership within the Navy Medicine enterprise, to include MTF commanding officers and executive officers, is drawn from the O-6 ranks of each of the four medical staff corps. The questions surrounding the relevance of range and the comparability of generalists and specialists take on even more importance as we observe those leaders who are selected to become the enterprise's senior executives. As the bulk of this study population moves into the primary consideration phase for selection to O-6 over the next five years, it will be fascinating to observe how the completion of JPME-I and its combination with the other courses of broadened learning are valued by promotion selection boards. The attainment of all three credentials was correlated with a significantly increased probability of promotion to O-4 in this study, and the increase in probability doubled among those officers considered for promotion to O-5. It will be interesting to investigate whether this correlation increases yet again, decreases, or proves to be insignificant in this same population as it matures into eligibility for selection to O-6.

C. FUTURE ACTION

Before moving into the recommendations for action on the topic of JPME-I, I wish to address an unintended discovery in my results that may provide a topic of future research. The regressions for promotion to both O-4 and O-5 uncovered statistically significant inverse correlations between an officer's age at the time of their previous promotion and their probability of promotion to the next rank. While it is disappointing that such a relationship is revealed by the data, the statistical significance does not necessarily imply an economical relevance.

The final model derived in the O-5 regression showed a 1.4 percentage point decrease in the probability of promotion for each additional year in the officer's age when promoting to O-4, and the final model in the O-4 regression shoed a 0.5 percentage point

decrease in the probability of promotion per year of age at the attainment of O-3. While each number is seemingly small, we must also extrapolate those numbers out and calculate that an officer with prior enlisted service and a few additional years of age, compared to a peer who commissioned as an officer directly out of college, may see their relative probability of promotion diminished. Additionally, an experienced medical professional who chooses to pursue a commission in the Navy at a later stage of their career may also be placed at a disadvantage; ten years of civilian service prior to entry into the Navy may reduce the individual's probability of promotion to O-5 by as many as 14 percentage points. This is a topic ripe for further research with dedicated resources, analysis, and targeted strategies for mitigation.

The Navy's strategy for "learning, innovation and personal and professional development" (Office of the Chief of Naval Operations, 2020, sec. 2) that was promulgated in NAVADMIN 137/20 clearly outlines the direction in which our enterprise needs to head with regard to completion of JPME-I. The focus on learning behaviors that are continuous and the rewarding of officers with an exceptional commitment to the learning process for themselves and others creates a need to encourage junior officers to pursue these strategic imperatives. The requirement that these achievements be documented by senior leaders and recognized by promotion selection boards only serves to further the urgency with which we adopt these behaviors. Mentors should encourage their charges to see beyond the present promotion probability statistics for the completion of JPME-I and to anticipate the future. The reporting requirements that were dictated in NAVADMIN 137/20 for members' learning activities, and the direction that Navy leaders must document such accomplishments accordingly, took effect with immediacy in May 2020 and will only further root themselves in our collective performance evaluation culture.

The NWC's revised delivery format for JPME-I via distance learning may enable a more rapid path to course completion, but the tenacity to successfully navigate the program still must be cultivated within each respective officer. Course completion and the earning of the JS7 AQD may be the primary driver of interest in this program, but participation itself should be recognized in an officer's fitness report trait grades and comments on performance. For education to be recognized as a strategic priority by senior

and junior officers alike, both participation and completion must be encouraged through tangible recognition on an officer's performance evaluation reports.

When demand exceeds supply for seats in the NWC distance education and in-residence programs, medical staff officers must register in advance and use the wait list system to drive the demand signal for additional class capacity. When selected to join a cohort, these same officers must then honor their commitment and steadfastly pursue the education. URL officers in pursuit of command-at-sea opportunities will be competing for the same seats in these cohorts; medical staff officers must not apply on a whim and then easily forego their selection. Ten months will seem like a long time to invest into education for a busy medical professional, but the personal and professional rewards to be reaped will be significant.

The completion of JPME-I by medical staff officers has served as a value-added credential for many years, but the Navy's reassertion of education as a strategic imperative and an ever-increasing focus on the joint delivery of healthcare functions necessitate a reemphasis on participation. Leaders are benefitted through the acquisition of a broad skillset and the development of range in their analytical abilities. With an organizational imperative on learning, an increased element of convenience in completing JPME-I, and an enterprise that wants to reward big-picture thinkers and solve complex problems, the time is now for medical staff officers to pursue completion of JPME-I.

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