


12-2019

## **ADDITIONAL GRADUATE DEGREES ASSOCIATED WITH PROMOTION AMONG PRIMARY CARE CLINICAL FACULTY**

MICHAEL A. HANSEN

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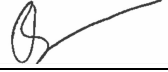
ADDITIONAL GRADUATE DEGREES ASSOCIATED WITH PROMOTION AMONG  
PRIMARY CARE CLINICAL FACULTY

by

MICHAEL A HANSEN, MD

APPROVED:

Ross Shegog, PhD, MPH



ACADEMIC ADVISOR/COMMITTEE

Jason Salemi, PhD, MPH



CE/THESIS/DISSERTATION SUPERVISOR

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2019

DEDICATION

To Elmira Rakhmatulina

ADDITIONAL GRADUATE DEGREES ASSOCIATION WITH PROMOTION AMONG  
PRIMARY CARE CLINICAL FACULTY

by

MICHAEL A HANSEN  
MD, McGovern Medical School, 2014  
BS, Texas A&M University, 2010

Presented to the Faculty of The University of Texas

School of Public Health

in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF PUBLIC HEALTH

THE UNIVERSITY OF TEXAS  
SCHOOL OF PUBLIC HEALTH  
Houston, Texas  
December, 2019

## PREFACE

What started as a personal question about meaningful steps for advancement and opportunity for young academic researchers has led to a much larger concern regarding gender, race, and equality in promotion within medical academia. While this project only begins to scratch the surface of these problems, it is an essential step in adding to the missing literature. It is the hope that this project and those that follow can provide evidence-based career choices, tools for physicians interested in promoting their skill sets, and potential pathways to improve equality in leadership.

## ACKNOWLEDGEMENTS

Enormous thanks and gratitude are needed for both my Academic Advisor, Dr. Ross Shegog, and my Thesis Supervisor, Dr. Jason Salemi. Their expertise, insight, and support for the project has been instrumental to its success. Dr. Winston Liaw has also been crucial to the project by providing vital data and substantive knowledge to the project. Dr. Denny Fe Agana has provided not only methodological and statistical knowledge to the project but also a significant portion of the manuscript development.

ADDITIONAL GRADUATE DEGREES ASSOCIATION WITH PROMOTION AMONG  
PRIMARY CARE CLINICAL FACULTY

Michael A Hansen, MD, MPH, MS  
The University of Texas  
School of Public Health, 2019

Thesis Chair: Jason Salemi, PhD, MPH

**Introduction:** Many young and ambitious physicians purposefully seek out meaningful careers in academic medicine, yet there are no evidence-based findings to assist these individuals in how to succeed in advancing their careers in this unique work environment. For early and mid-career faculty, a growing number of trainings and opportunities are available but with little insight as to which choices may have the biggest impact. One common perception is the need for additional advanced training, such as a Master of Public Health.

**Aims and Method:** This study sought to provide evidence-based information about additional training by quantifying the benefit of added degrees on promotion for primary care physicians. The project was conducted as a cross-sectional study in 2019 using publicly available online data of full-time academic faculty in primary care departments within schools of medicine across the United States. Two data sets were obtained, one with a nationally represented sample of family medicine physicians and the second being a multi-specialty cohort from academic institutions across Texas. Analyses included descriptive statistics, unadjusted generalized linear regression models (i.e., logistic regression), and



adjusted models per academic rank level (i.e., those associated with higher academic rank (Associate and Associate to Full Professors) amongst all academic clinicians and those associated with higher rank (Full Professors only) amongst mid and senior level academic clinicians).

**Results:** Added degrees were held by approximately 14% of all academic family physicians and approximately 12% of all primary care physicians. Amongst all family physicians, all added degrees were associated with an increased likelihood of association of being in a higher academic rank (aORs between 2.05 – 3.20), whereas PhD, MPH, and MS were the only added degrees associated with higher academic rank amongst mid and senior level faculty (aOR 1.85 – 2.47). Amongst all primary care specialties, an added degree continued to be significantly associated with higher academic rank amongst all faculty (aOR = 2.97, p-value 0.03). Important other covariates were found to be gender, specialty, and time in practice.

**Discussion:** While general perceptions and beliefs commonly portray added degrees as beneficial investments for physicians, this study is the first to demonstrate and quantify this correlation. While there are numerous confounders, this study adjusts for many demographic features as well as time in practice, all of which that are known or proven to be associated with promotion. However, it is still challenging to account for academic productivity and future studies are being designed to better clarify the context surrounding the motivations and outcomes associated with physicians who obtain added degrees.

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## **BACKGROUND**

### **Literature Review**

Lack of evidence and growing prevalence of dual degree programs in medical education has led to the need for better describing the added value of obtaining an additional degree, such as a Master's of Public Health (MPH) or a Master's of Science (MS), for individuals who also have a terminal medical degree (i.e., Medical Doctorate, Doctorate of Osteopathic Medicine, or Bachelor of Medicine/Bachelor of Surgery degrees). This topic touches on several facets of health care, graduate education, and career development that are not traditional areas for evidence-based research. Notably, searching for any information regarding the importance or value of obtaining, for example, an MPH in addition to a medical doctorate, will result in numerous websites that will tout the perceived and potential benefits that are possible with this added degree. Many of which only focusing on its ability to create new career and practice opportunities, such as working in population health or research (1-3). Yet, despite the numerous numbers of articles written about this subject, not one can provide discrete values or evidence to support these claims and they largely remain conjecture and personal experiences. Furthermore, there is no literature or information that describes the prevalence of these degrees in any setting. However, we do know that access and opportunity for physicians to seek additional training has increased drastically over the past 10 years with the capability of online degrees and a rapidly expanding number of dual degree opportunities offered as a part of medical training (4). This corresponds with a well described need and call to action for physicians with these added degrees as well.

Despite a historic divergence between medicine and public health, growing interest and necessity has forced their divergence into one comprehensive service of healthcare driven by population health outcomes and newly emerging reimbursement strategies (5). This cross-over of specialties continues to apply to many other fields as well, including aspects legal, educational, technology, and other domains. Medicine can no longer keep itself as an island and must learn to incorporate these equally important aspects of clinical care into the everyday practice of modern-day medicine. This is often encompassed as what is being called community-centered medicine and social determinants of health (6). Yet, while we have acknowledged we need to address these non-traditional features of medicine in our clinical care, there remains little understanding and literature regarding the development of leadership, particularly physician leadership, to advocate and implement these new ideas into medicine. We are left without an understanding of the value and potential that these individuals have and how they fit into an industry that should care about measurable and actionable outcomes.

It is for these reasons that the enormous literature gap and pervasive amounts unfounded conjecture regarding these added degrees is so disconcerting. In addition to a growing population of physicians now having access to added training, and presumably obtaining these added degrees, we find very little data or research to assess what meaningful value is being obtained from them and if they are leading to the impact or workforce they are intended.

## **Public Health Significance**

The nexus between public health and clinical care holds an area of medicine where vital data, interventions, and policy attempt to join these important aspects of health care. However, these fields are a less harmonious combination than it would intuitively appear. One of the earliest and pervasive barriers that continues to disintegrate public health and medical care is the basic-science focus of physician training followed by increasingly siloed medical specialization (7). This is highlighted with most physician-scientists remaining within the realm of highly-specialized research areas either on a clinical or microbiological level. Whereas research and clinical practice at a population level is notably less assessed, taught, and reimbursed for physicians (8).

This disassociation of public health from medicine is a critical reason for many sub-optimal health outcomes in the United States as compared to other countries. This flaw in our health care system was well stressed at the turn of the century, sparking a nationwide emphasis on increasing the primary care and public health workforce (9). While it is recognized that these fields overlap inherently, their practitioners historically do not. But with all-natural demands, a supply of primary care physicians and physician-scientists interested in addressing population-level health care has been developing gradually. Whether it is in their clinical care, practice management, research, advocacy, teaching, or leadership positions, primary care physicians play an ever-increasing role in the public health workforce (10,11). Yet, this sector of health care remains ambiguous in many ways, with little information that describes the professional environment and career potential for the primary care physicians in public health.

Although it is difficult to describe the entire demographic of physicians working in public health, most seek added training, commonly a Masters of Public Health (MPH) or Masters of Science (MS) (12). These added degrees provide a possible way to distinguish a unique population of physicians and can be a feasible proxy to describe and understand physician public health practitioners. Access to these added degrees has also become easier to obtain with increasing numbers of online classes and dual degree programs offered within or in partnership with medical schools. However, despite their value and potential, little evidence has been shown to prove any meaningful outcomes associated with primary care physicians obtaining added degrees and if they remain practicing in some form of public health capacity.

By studying objective outcomes, such as academic rank, a better understanding can be obtained regarding the value that added degrees project onto those that obtain them. It also begins a path of inquiry into highly meaningful but surprisingly sparse field research that is vital to students, educators, administrators, and policy makers to make evidence-based decisions about the growing number and variety of dual degree options for clinicians. The outcomes of such research relate directly to curriculum design, time and cost of education, and ultimate work force outcomes. Specifically, so that cultivating these motivated physicians effectively can be done so with forethought and consideration.

### **Hypothesis, Research Question, Specific Aims or Objectives**

The objective of the study was to assess some form of objective outcome for primary care clinicians obtaining added training either at the doctoral or master level degree. Three specific research questions were developed: RQ 1) What is the distribution and prevalence of



added degrees amongst academic primary care clinicians? RQ 2) What are unique characteristics associated with the ascertainment of added degrees? RQ 3) Are primary care clinicians of higher academic rank more likely to have an added degree?

## METHODS

### Study Design, Population and Eligibility

The project was designed as a cross-sectional study using academic profiles published online by medical institutions across the United States. Information regarding specialty, name, degrees, and titles of academic primary care physician faculty. Specifically, information was derived from the directories of primary care clinical departments (i.e., family medicine, general internal medicine, general pediatric medicine, geriatric medicine, and general obstetrics and gynecology) that were associated with medical schools or post-graduate training programs in the United States. For each specialty, a list of all eligible programs were derived from the Association of American Medical Colleges website (13). Inclusion criteria consisted that programs were in good standing with the governing body, had active program websites with listed faculty profiles, and reported information regarding added degrees and academic rank (i.e., assistant, associate, or full professor). Exclusion criteria consisted of physicians that were subspecialized within their specialty, had an academic rank or title inconsistent with our defined structure, or physicians who had a doctorate of jurisprudence as an added degree.

After screening these sites, we found that there was a total of 384 academic programs listed across all primary care departments, of those we were able to identify 214 (55.7%) programs that were eligible for inclusion, resulting in a final list of 3170 physicians with their associated degrees and academic ranks.

## **Human Subjects, Data Security and Ethical Considerations**

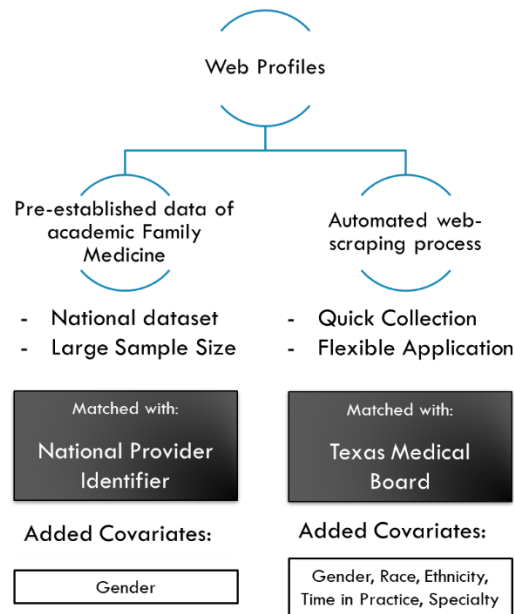
Our study collected information that was publically available and did not correlate findings to any level that would be traceable back to a single individual. This was due to the aggregate nature of the analysis and reported findings, as it was specifically designed. Regardless, for additional security, after merging datasets, all individual level identifiable information was removed from the tables. All data was collected and stored on password-protected computers, behind badge-access only security office doors within the Department of Family and Community Medicine at Baylor College of Medicine. Lastly, the project in its entirety was submitted for IRB review and deemed exempt by the University of Texas, Committee for the Protection of Human Subjects and Baylor College of Medicine Institutional Review Board.

## **Data Access and Management**

Our study consisted of two eligible data sets, first data set was a pre-existing list of academic family physicians across the US from 2016, was extracted by manual review of each website, and captured all information within our inclusion criteria. Second data set was exclusive to the state of Texas in 2019 that captured all inclusion criteria via an automated web scraping method which extracted all relevant information within our inclusion/exclusion definitions. Each data set was matched with additional physician information to help account for various confounders as a part of the analysis. The nationally representative family physician data set was able to be matched with the National Provider Identifier (NPI) in order to obtain physician gender. Similarly, the Texas primary care data set was matched to the

Texas Medical Board (TMB) data that was able to add physician gender, race, ethnicity, age, time since medical school graduation, and specialty.

Figure 1. Data ascertainment and matching with secondary databases



The 2016 national family physician dataset was matched by state and name to the NPI information. Web scraping procedure was performed by extracting the sites XML code using R package ‘rvest’(14) and stored as a vector of text corpus objects within R. Each corpus was then analyzed using a customized text extraction code that was developed specifically for this project. The physician’s first name, middle name, last name, degrees, and rank were extracted and assigned to a new dataset where each variable was stored in a unique column. This information was then matched by last and first name to the TMB data. In both data sets, any duplicates or unmatched physicians were removed from the final data set used for analysis.

## Variable Definitions

As this study was exclusively interested on the impact of added degrees for physicians, clinicians with either a Medical Doctorate (MD), Doctorate of Osteopathic Medicine (DO), or Bachelor of Medicine – Bachelor of Surgery (MBBS) degree were included in the cohort. For the remainder of the study all of the above medical degrees were collectively referred to as ‘MD’ for consistency and simplicity. Physicians with no added degrees (i.e., no masters or doctoral level degrees listed behind their names in addition to their medical degree) were classified as ‘MD + only’. Physicians with either a Doctorate of Philosophy (PhD) in any discipline or Doctorate of Public Health (DrPH) were classified as ‘MD + PhD’. Those with a Master of Public Health (MPH) or Master of Science in Public Health (MSPH) were classified as ‘MD + MPH’. Those with a Master of Science (MS) degree in any other discipline were classified as ‘MD + MS’. Lastly, any other master’s level degrees not previously listed (e.g., Masters of Business Administration, Masters of Education) were classified as ‘MD + other’. A summary category was then comprised for all added degrees as a comprehensive classifier called ‘MD + any added degree’. The only added degree that was explicitly excluded was the doctorate in jurisprudence, as clinicians with this particular added degree were relatively rare and not succinctly categorized within one of the abovementioned classifications.

With the outcome of interest being academic rank, physician titles were captured within one of three categories: ‘Assistant Professor’, ‘Associate Professor’, and ‘Full Professor’. In certain institutions, these titles were further characterized with additional information, such as ‘instructor’, ‘clinical’, ‘research’, ‘chair’, or ‘dean’. While this

information was captured in cases where it was available, its prevalence was inconsistent and these added designations were not used within the analysis. It is also important to note, there were many academic departments that did not use these traditional academic ranks and were not included within the study. A majority of these programs were community academic programs, typically located in rural communities.

Table 1. Summary of variable content

Added Degrees	MD	MD, DO, MBBS
	PhD	PhD (any discipline) or DrPH
	MPH	MPH or MSPH
	MS	MS
	Other	MBA, MSW, MEd
Academic Rank	Assistant	Clinical or Research Professors
	Associate	Clinical or Research Professors
	Full	Chairs, Clinical, or Research Professors

### Statistical Analysis

Congruent with our first research question, descriptive statistics were used in both arms of the study to characterize the prevalence and distribution of added degrees across all academic ranks. This distribution was further subdivided by the respective covariates in each study cohort that were available. In the second arm of the study, physician characteristics were compared between ‘MD + only’ and ‘MD + any added degree’ using chi-square and student t-test statistics where appropriate.

Proportion of physicians across academic ranks were compared per each added degree category. Physicians with no added degrees (i.e., MD + only) were used as the reference group for all subsequent analyses. In the national family medicine data set, each degree grouping was further subdivided by gender. Distribution of physicians in higher

academic ranks were then compared per gender per added degree via the absolute and relative differences as compared to their respective ‘MD + only’ counterparts.

Lastly, a bivariate and multivariable logistic regression model was used to estimate the association between various degree combinations and their association with rank attainment. Each multivariable model included all relevant covariates in the data set that were captured in their respective data sets. Unadjusted and adjusted odds ratios were reported in conjunction with their 95% confidence intervals and associated p-values. All statistical analyses were conducted using RStudio statistical software (version 1.0.153 ) (16), using the ‘tidyverse’ package (17).

## JOURNAL ARTICLE 1

**Title of Journal Article:** Are Additional Graduate Degrees Associated with Higher Academic Rank Among Family Medicine Physicians?

**Name of Journal Proposed for Article Submission:** Journal of the American Board of Family Medicine

### Cover Letter

Young physicians, while in medical school, residency, and the beginning years of their career, reside within a formative time that has great impact on their future as physicians. However, long-term career planning is often ignored due to the immediate challenges of course work and clinical rotations, followed by the stressors of getting into residency, fellowship, or their first professional position. Although pertinent for career decision making, little formal information and guidance are provided to these young doctors in considering less immediate aims and more abstract features of a medical career. Specifically, careful thought in how to assure a career in medicine that encompasses both personal and professional fulfillment, sustainability in the age of physician burnout, and continued growth in some capacity (e.g., clinical skills or leadership), are not readily available.

We find that many family physicians have considered seeking additional graduate degrees, such as a Master of Public Health (MPH), to impact their careers and professional development. In academia it has commonly been observed to be associated with leadership and promotion across different clinical departments. There is also a substantial amount of non-scientific literature that correlates additional degrees as highly positive professionally



and even lucrative. However, no evidence exists to support these assumptions. In fact, there are no publications that we can find that describes the number of physicians that have added degrees in any work environment. We seek to explore this topic further in the following research study and expand upon it in future works. We appreciate your time and consideration of manuscript.

### **Title Page**

Authors:

Michael A. Hansen, MD<sup>1</sup>; Denny Fe G. Agana, PhD, MPH<sup>1</sup>; Winston Liaw, MD, MPH<sup>2</sup>; Roger Zoorob, MD, MPH<sup>1</sup>; Ross Shegog, PhD, MPH<sup>3</sup>; Jason L. Salemi, PhD, MPH<sup>1</sup>

Affiliations:

<sup>1</sup>Department of Family and Community Medicine, Baylor College of Medicine

<sup>2</sup>Department of Health Systems and Population Health Sciences, College of Medicine, University of Houston

<sup>3</sup>Center for Health Promotion and Prevention Research, The University of Texas School of Public Health

Corresponding Author:

Michael A. Hansen, MD

Department of Family and Community Medicine, Baylor College of Medicine

3701 Kirby Dr, Suite 600

Houston, TX 77098

mahansen@bcm.edu

Conflict of Interests:

- none

Funding Statement:

This research was supported by the Health Resources and Services Administration, an agency of the US Department of Health and Human Services, grant number T32 HP10031 (Michael A. Hansen's and Denny Fe G. Agana's postdoctoral funding). The funding source/study sponsor had no role in the writing of this manuscript, or decision to submit the manuscript for publication.

Acknowledgement:

- none

Word limit: 1500

Word count: 1500

## Manuscript

### Introduction:

In the United States (US), the clinical work setting for most physicians has changed drastically with more than half of all doctors practicing as employees of larger group practices.<sup>1</sup> This shift into larger organizations requires most physicians to take on new roles of leadership and administration.<sup>2</sup> While not all physicians desire responsibilities beyond their clinical duties, at least one-third of early and mid-career physicians report a desire to pursue additional leadership, research, or educational opportunities.<sup>3,4</sup> These rates are even higher in academic medicine where these additional duties are tied directly to promotion and greater pay.<sup>5</sup>

In academia, the pathway to promotion remains elusive to many physicians;<sup>6</sup> and according to the Association of American Medical Colleges (AAMC), 38% of physician faculty leave academic medicine within 10 years.<sup>7</sup> Women in particular continue to have difficulty achieving equity in salary and career advancement across all specialties even after accounting for age, experience and research productivity.<sup>8</sup> However, a notable exception has been observed amongst physician scientists, defined by the AAMC as clinicians with an additional doctorate degree (MD-PhD), among whom there is a much smaller difference of average pay between genders as compared to their non-scientist counterparts.<sup>9</sup> Yet, this precludes the ability to assess the potential impact that other types of graduate-level degrees may have on advancement in academia. We conducted an analysis to assess the extent to which possession of additional graduate degrees was associated with higher academic rank among family physicians in academic medicine. We hypothesized that family physician

faculty with additional degrees will achieve higher ranks than those without additional degrees, and that the impact of additional degrees will be different for men and women.

Methods:

conducted a cross-sectional analysis using data from academic medical institutions across the US that publish faculty profiles online. In 2016, data was collected from academic family medicine departments listed by the Association of Departments of Family Medicine and contained the following elements required as inclusion criteria: faculty names, degrees, and academic rank. 129 departments from 42 states and Washington DC were found to meet inclusion criteria, resulting in a total of 6055 total physicians. Name, state, and specialty of the physicians were used to match to the National Provider Identifier database to obtain gender. Successful matching occurred in 4879 of physician cases (80.6%). After matching, the resultant data file was de-identified prior to analysis. The study was deemed exempt by the Baylor College of Medicine Institutional Review Board.

Listed degrees were summarized as: ‘PhD’ for documented Doctorates of Philosophy or Doctorates of Public Health; ‘MPH’ for Masters of Public Health and Masters of Science in Public Health; and ‘MS’ for Masters of Science. All clinical doctoral degree types, MD, DO, and MBBS variations, were captured and collectively referred to as ‘MD’. Those without any additional degrees were defined as ‘MD + only’, whereas those with additional degrees were defined as ‘MD + PhD’, ‘MD + MPH’, or ‘MD + MS’. A final category, ‘MD + other’, consisted of physicians with less-common degrees observed in the data: Masters of Business Administration, Masters of Social Work, or a Masters of Education. The primary

outcome was current academic rank: Assistant, Associate, or Full Professor. Other academic ranks (e.g., Instructor) were not included in this study.

We described the distribution of faculty across graduate degree categories, gender, and academic ranks. Among all faculty, we compared differences in both full professorship, and a combined outcome of full or associate professorship. Also, among a sample including only those at the associate professor rank or higher, we compared differences in full professorship. Crude and adjusted logistic regression models, with gender and degrees as predictors, were used to generate adjusted odds ratios (aOR) and 95% confidence intervals (CI) that represented their association with academic rank. Data analysis was performed using RStudio (version 1.0.153).<sup>10,11</sup>

#### Results:

Of the 4879 academic family physicians, 661 (13.5%) had one or more additional graduate degree; 105 (2.2%) had a PhD, 385 (7.9%) had an MPH, 127 (2.6%) had an MS, and 44 (1.0%) had an 'other' graduate degree. The prevalence of having an additional degree was similar for men (13.6%) and women (13.5%). Physicians with one or more additional graduate degrees had a higher proportion of their faculty at associate or full professor rank compared to those without an additional degree (56.4% vs. 30.5%) (Table 1). The impact of any additional graduate degree was similar among men and women – a near two-fold increased likelihood of being at associate or full professor rank. Even when restricting to faculty who received at least one promotion (from assistant to associate), those with additional graduate degrees were more likely to be full professors than those with only an

MD degree (men: 69.0% vs. 44.1%; women: 44.9% vs. 35.8%). We did not observe substantial variation in the impact of an additional degree according to the type of degree conferred (PhD vs. MPH vs. MS vs. other). The one anomalous finding was among women at the associate or higher rank with an MD + MS degree, who were less likely than their MD only counterparts to be at the full professor rank.

JA1-Table 1. Distribution of faculty by gender, academic rank, and attainment of additional graduate degrees

	Academic Rank			Among all faculty ranks		Among associate and full professors	
	Assistant professor	Associate professor	Full professor	Absolute difference at associate or full rank	Relative difference at associate or full rank	Absolute difference at full rank	Relative difference at full rank
	n (%)	n (%)	n (%)	%	ratio	%	ratio
All faculty							
Men	1699 (59.4)	585 (20.5)	575 (20.1)	n/a	n/a	n/a	n/a
Women	1522 (75.3)	309 (15.3)	189 (9.4)	n/a	n/a	n/a	n/a
M:F ratio	0.79	1.34	2.14				
MD <sup>a</sup> + only							
Men	1565 (63.4)	506 (20.5)	399 (16.2)	reference <sup>b</sup>	reference <sup>b</sup>	reference <sup>b</sup>	reference <sup>b</sup>
Women	1368 (78.3)	244 (14.0)	136 (7.8)	reference <sup>b</sup>	reference <sup>b</sup>	reference <sup>b</sup>	reference <sup>b</sup>
M:F ratio	0.81	1.46	2.08				
MD <sup>a</sup> + any added degree <sup>c</sup>							
Men	134 (34.4)	79 (20.3)	176 (45.2)	29.0	1.8	24.9	1.6
Women	154 (56.6)	65 (23.9)	53 (19.5)	21.7	2.0	9.1	1.3
M:F ratio	0.61	0.85	2.32				
MD <sup>a</sup> + PhD <sup>d</sup>							
Men	25 (32.9)	19 (25.0)	32 (42.1)	30.5	1.8	18.6	1.4
Women	17 (58.6)	5 (17.2)	7 (24.1)	19.7	1.9	22.5	1.6
M:F ratio	0.56	1.45	1.75				
MD <sup>a</sup> + MPH <sup>e</sup>							
Men	69 (32.7)	41 (19.4)	101 (47.9)	30.7	1.8	27.0	1.6
Women	98 (56.3)	40 (23.0)	36 (20.7)	22.0	2.0	11.6	1.3
M:F ratio	0.58	0.84	2.31				
MD <sup>a</sup> + MS <sup>f</sup>							
Men	26 (35.1)	14 (18.9)	34 (45.9)	28.3	1.8	26.7	1.6
Women	30 (56.6)	17 (32.1)	6 (11.3)	21.7	2.0	-9.7	0.7
M:F ratio	0.62	0.59	4.06				
MD <sup>a</sup> + other <sup>g</sup>							
Men	14 (50.0)	5 (17.9)	9 (32.1)	13.4	1.4	20.2	1.5
Women	9 (56.3)	3 (18.8)	4 (25.0)	22.0	2.0	21.3	1.6
M:F ratio	0.89	0.95	1.28				

<sup>a</sup> Doctorate of Medicine, Doctorate of Osteopathic Medicine, or Bachelor of Medicine/Bachelor of Surgery degree

<sup>b</sup> Each absolute or relative difference presented compares a faculty group with an MD and additional graduate degree to the 'MD only' group. The comparison is gender specific (e.g., male faculty with an MD + any added graduate degree versus faculty with an MD only).

<sup>c</sup> Includes all doctoral and master level added degrees

<sup>d</sup> Doctorates of Philosophy or Doctorates of Public Health

<sup>e</sup> Masters of Public Health and Masters of Science in Public Health

<sup>f</sup> Masters of Science

<sup>g</sup> Masters of Business Administration, Masters of Social Work, or a Masters of Education

Having an additional graduate degree was associated with an approximate three-fold increase in the likelihood of being at the associate or full professor rank compared to not

having an additional degree, with small variation by type of degree attained (aOR: PhD, 3.20; MPH, 3.18; MS, 3.01; other, 2.05) (Table 2). Similarly, among those faculty who achieved at least associate professor rank, those with an additional degree, compare to those without, were two times as likely to be a full professor (aORs: PhD, 2.18; MPH, 2.47; MS, 1.85). Regardless of the group based on additional degrees, women were less likely than men to be at the associate rank or higher. Moreover, the gender gap in attainment of associate rank or higher was more pronounced among those faculty with an additional graduate degree than among those without one. In multivariable models, women were nearly half as likely as males to achieve associate professor rank or higher (aOR 0.47, 95% CI 0.42 – 0.54), even after adjusting for possession of an additional graduate degree.

JA1-Table 2. Association between additional graduate degrees and academic rank among family physician faculty

	Among all faculty ranks Odds of associate or full professor rank		Among associate and full professors Odds of full professor rank	
	<u>Unadjusted</u>	<u>Adjusted</u>	<u>Unadjusted</u>	<u>Adjusted</u>
	OR (95% CI) p-value	Adj. OR (95% CI) p-value	OR (95% CI) p-value	Adj. OR (95% CI) p-value
Male	reference	reference	reference	reference
Female	<b>0.48 (0.42 - 0.54) &lt;0.001</b>	<b>0.47 (0.41 - 0.53) &lt;0.001</b>	<b>0.62 (0.50 - 0.77) &lt;0.001</b>	<b>0.60 (0.48 - 0.75) &lt;0.001</b>
MD <sup>a</sup> + only	reference	reference	reference	reference
MD <sup>a</sup> + PHD <sup>b</sup>	<b>3.42 (2.31 - 5.12) 0.001</b>	<b>3.20 (2.15 - 4.81) &lt;0.001</b>	<b>2.28 (1.36 - 3.88) 0.002</b>	<b>2.18 (1.30 - 3.73) 0.003</b>
MD <sup>a</sup> + MPH <sup>c</sup>	<b>2.98 (2.41 - 3.69) &lt;0.001</b>	<b>3.18 (2.57 - 3.96) &lt;0.001</b>	<b>2.37 (1.78 - 3.20) &lt;0.001</b>	<b>2.47 (1.83 - 3.34) &lt;0.001</b>
MD <sup>a</sup> + MS <sup>d</sup>	<b>2.89 (2.03 - 4.15) &lt;0.001</b>	<b>3.01 (2.09 - 4.33) &lt;0.001</b>	<b>1.81 (1.12 - 2.95) 0.02</b>	<b>1.85 (1.14 - 3.03) 0.01</b>
MD <sup>a</sup> + Other <sup>e</sup>	<b>2.08 (1.14 - 3.79) 0.02</b>	<b>2.05 (1.11 - 3.76) 0.02</b>	2.28 (0.95 - 5.79) 0.07	2.35 (0.98 - 6.00) 0.06

<sup>a</sup> Doctorate of Medicine, Doctorate of Osteopathic Medicine, or Bachelor of Medicine/Bachelor of Surgery degree

<sup>b</sup> Doctorates of Philosophy or Doctorates of Public Health

<sup>c</sup> Masters of Public Health and Masters of Science in Public Health

<sup>d</sup> Masters of Science

<sup>e</sup> Masters of Business Administration, Masters of Social Work, or a Masters of Education

## Discussion:

It is relatively common for physicians to obtain an additional graduate degree such as an MPH.<sup>12</sup> However, there are no data that have consistently captured how many doctors have obtained one, at what point of their careers the degree(s) was obtained, and the extent to



which the degree(s) impacted their career goals. Access to these additional degrees has become easier to obtain with increasing numbers of online classes and dual degree programs offered within or in partnership with medical schools.<sup>13</sup> Many programs promote pursuance of these degrees as being advantageous. However, to date, this remains the only study that we are aware of that shows an association between additional graduate degrees and an objective professional outcome for physicians in academia.

Despite being a cross-sectional analysis, our findings suggest that graduate degrees may be associated with academic promotion. Importantly, for family physicians, a master's degree tended to increase the likelihood of being at a higher rank (i.e., being promoted) in a manner similar to a doctorate. For most clinicians, the cost for obtaining an additional degree goes beyond tuition; the time and resources required to complete coursework and other educational requirements can significantly impact professional duties, personal time, and work-life balance. Obtaining such degrees as a practicing physician is daunting and pathways with protected time within medical school, residency, or fellowship often delay non-trainee level salary reimbursement and educational debt repayment. These immediate, high-priority concerns for clinicians make it difficult to justify the added expense of further education.<sup>14</sup> However, the evidence from our study suggests that as a long-term career asset, pursuing the acquisition of such a degree can provide a positive return on its investment.

Additional degrees were associated with a reduced 'promotional gap' for women in academic medicine among younger faculty. This association was not observed for the Associate and Full professor level. This study draws upon a nationally representative sample that reliably captures novel characteristics about family physicians who choose to practice

within academia. As mentioned earlier, there are no comprehensive data sources that contain information about additional degrees at the master's level among physicians. This limits our ability to account for a number of other important confounders that are likely to be associated with academic rank such as age, time in practice, and timing of degree ascertainment (e.g., during training, as junior faculty, after first promotion). Moreover, the lack of longitudinal data precludes our ability to discuss how degree impact promotion, rather we use a proxy of current academic rank. More robust data would allow for an intersectional approach to assess disparities amongst women and racial minorities. Despite these limitations, this study provides data that support the value of graduate degrees beyond the medical degree. Continued exploration of additional degrees and their impact on physicians will require creative research methods to capture reliable data including important aspects of physician career development.

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## CONCLUSION

While the project covers two different populations, we find that each demonstrate a similar benefit for physicians in obtaining an added degree. Furthermore, in each study we were able to look at unique aspects of physician characteristics (specifically gender, age, and specialty) and how they correlate with higher academic ranks. While some of this information has been well described before (e.g., women are much less likely to be advanced to higher ranks), we can better describe how this impacts physicians that have sought added training and are clearly interested in work beyond the scope of traditional clinical practice.

The novel approach to collecting this data is what really made it possible due to the poor collection of information related to non-PhD added degrees. While we feel confident in the reliability of the profiles published by each institution, there remains two potential sources of bias. The first being misclassification with those of higher academic rank more likely to update their online clinical profiles, either simply due to time in practice or vested interested in their professional presentation. The second and more problematic limitation that the study may have to address is the potential for incidence-prevalence bias. While we know that faculty retention remains a challenge in many academic institutions, it appears to affect clinician researchers and educators compared to their clinic only counterparts. Thus, it is very likely that physicians with added degrees are more likely to stay within academia and our study is unable to account for the potential loss of MD only physicians that don't stay within academia long enough to be promoted. This would create an inflation of physicians with added degrees in higher academic ranks that is not necessarily due to the degrees themselves but rather the general practice and professional goals of the physicians.

As one of the first studies of its kind to describe the impact of added degrees, specifically at the master's level, this information is a vital step towards understanding meaningful outcomes associated with their ascertainment. Future work will continue to explore objective outcomes associated with added degrees while also trying to account for time to promotion. Additionally, we hope to also explore this topic in a qualitative manner as well, to assess motives, satisfaction, and career pathways amongst clinicians with added degrees.

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