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SHORT REPORT

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Analysis of Physician Compensation Studies by Gender, Race, and Ethnicity

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Abstract

Purpose: This report investigated physician compensation studies by gender, race, and ethnicity.

Methods: Published U.S. physician compensation studies were assessed.

Results: Of the 47 data sets within 46 studies, 36 analyzed compensation by gender and 32 (88.9%) found disparities. Thirteen and eight analyzed for race and ethnicity, with disparities found in four (30.8%) and none, respectively. The sample sizes of the four data sets with differences by race were among the largest in the subset.

Conclusion: Most studies demonstrate pay disparities for women, but not for people who identify with underrepresented race/ethnic groups; however, small sample sizes may affect results.

Keywords: ethnicity; gender; physician compensation; physician salary

Introduction

Among the most important issues confronting the increasingly diverse physician workforce is fair pay. In the United States, both federal law and many states' laws support compensation for people based on the work that is done rather than who is doing the work.¹

Despite this, there is a large body of evidence that demonstrates pay gaps for women in general. A recent systematic review found that across countries and medical specialties, women physicians earned significantly less than men despite similar demographic and work-related profiles.²

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Table 1. Physician Compensation Studies and Analysis by Gender, Race, and Ethnicity

Study references First author name (year) Multivariable analysis including race/ethnicity/gender (intersection)	No. of participants	Population studied	Variables in multivariable analysis	Gender disparities studied/found	Race disparities studied/found	Ethnicity disparities studied/found
Hayes (2020) ¹⁵	2,845	Physicians at one academic institution (Mayo Clinic) with three locations	Gender, race/ethnicity, specialty, leadership position, full-time equivalent status, experience, age, work location, licensure, other compensable activities	Y/N	Y/N	Y/N
Lo Sasso (2020) ⁶	16,047	New York State physicians entering first year of attending-level patient care practice	Specialty training, number of job offers, sex, age, gender, race/ethnicity, citizenship, education and training, educational debt, principal practice setting, location type, obligation to health professional shortage area, weekly patient care hours	Y/Y After adjustment, women made \$7,700 less in 1999, rising to \$20,200 less by 2017	N/N	N/N
Langer (2019) ²⁰	41,396	Physicians in clinical practice who participated in the Community Tracking Survey	Gender, age, degree, training, work hours, weeks worked, revenue sources, practice ownership status, geographic region, metropolitan statistical area category, race, ethnicity	Y/Y Significant differences in gender found by specialty	Y/Y Significant differences in race found by specialty	Y/N
Pallant (2019) ²¹	149	Program director members of the Association of Pediatric Program Directors	Gender, race/ethnicity, age, academic rank, clinical appointment, number of raises, tenure track, years in program director role, number of noncombined residents in program	Y/Y 26.9% of men vs. 6.1% of women earned more than \$250,000 annually	Y/N	Y/N
Apaydin (2018) ¹¹	439	Physicians from 30 diverse practices within six states	Hours worked, composition of work hours, percent procedural time, specialty, compensation type, age, years in practice, gender, race, ethnicity, state and practice random effects	Y/Y After adjustment, women made \$27,404 less income	N/N	N/N
Read (2018) ²²	374	Members (nonstudent) of the Internal Medicine Insider Research Panel within the American College of Physicians	Bivariate analysis performed comparing salary by gender and one other factor: specialty, employment status, age, race, primary professional setting, primary professional activity, marital status, spousal employment status, parental status	Y/Y Median annual salary for women was \$50,000 lower	Y/N	N/N

(continued)



Table 1. (Continued)

Study references First author name (year)	No. of participants	Population studied	Variables in multivariable analysis	Gender disparities studied/Found	Race disparities studied/Found	Ethnicity disparities studied/Found
Madsen (2017) ¹⁹	1,371	Full-time faculty members in U.S. academic emergency departments via the 2015 Academy of Administrators in Academic Emergency Medicine Salary Survey	Race/ethnicity, region, rank, years of experience, clinical hours, core faculty status, administrative roles, board certification, fellowship training, gender	Y/Y After adjustment, women's salaries were \$19,418 lower	Y/N	Y/N
Freund (2016) ¹⁰	490	Sample of academic medical faculty from 24 U.S. medical schools	Race/ethnicity (combined category), gender, years since first academic appointment, retention in academic career, academic rank, departmental affiliation, percent effort in various areas, marital status, parental status, any leave or part-time status in the years between surveys	Y/Y After adjustment, women earned \$16,982 less in annual compensation	Y/N	Y/N
Ly (2016) ¹²	61,327 from ACS survey 17,583 in HSC survey	2000–2013 ACS to 2000–2008 HSC survey	ACS: age, sex, race, weekly hours worked, state of residence, time period HSC: Age, sex, race, number of hours worked per week, years in practice, practice type, percentage revenue from Medicare or Medicaid, specialty type	Y/Y In both studies, women had lower incomes than men	Y/Y In both studies, Black men had lower incomes than White men; incomes were similar for Black and White women	N/N N/N
Jagsi (2013) ⁸	1,012	Recipients of NIH mentored career development awards	Gender, age, race, marital status, parental status, additional doctoral degree, academic rank, years on faculty, specialty, institution type, region, institution NIH funding rank, K award type, K award funding institute, K award year, work hours, research time	Y/Y After adjustment, women had lower annual salaries by \$10,921	Y/Y Y/N	N/N
Seabury (2013) ²³	7,653	1987–2010 March Current Population Survey	Hours worked, age, sex, race, state	Y/Y The annual earnings gap did not change significantly over time (\$33,840 in 1987–1990 and \$34,620 in 1996–2000)	N/N	N/N

(continued)

Table 1. (Continued)

Study references First author name (year)	No. of participants	Population studied	Variables in multivariable analysis	Gender disparities studied/found	Race disparities studied/found	Ethnicity disparities studied/found
Analysis by race/ gender (separate)	Rosenthal (2017) ²⁴	157 Psychosomatic Medicine	Multivariable analysis not performed	Y/Y Average women's salary was \$20,000 less	Y/N	N/N
Analysis by race and/or ethnicity only (not gender)	Marcelin (2019) ¹⁶	2,075 Members of the Infectious Diseases Society of North America	Practice type, race, ethnicity	N/N	Y/Y African American ID physicians were paid 7–13% less for most types of employment	Y/N
	Kaplan (2018) ²⁵	604 Sample of academic medical faculty from 24 U.S. medical schools	Race/ethnicity, setting, rank, effort distribution in teaching, clinical and research activities	N/N	Y/N	Y/N
	Lin (2016) ²⁶	26 in 2004, 38 in 2009, 54 in 2014	Faculty at one academic (Johns Hopkins) otolaryngology program	Multivariable analysis not performed	N/N	Y/N
	Cheng (2020) ²⁷	72 Members of the American Medical Informatics Association	Multivariable analysis not performed on the physician subset	Y/Y Unadjusted physician salaries were \$23,135 lower for women	N/N	N/N
	Gambhir (2021) ²⁸	170 Surgeons within a large multi-institutional health care system (University of California)	Academic rank, surgical subspecialty, gender	Y/Y Adjusted mean salaries were \$45,904 lower for women	N/N	N/N
	Pelley (2020) ²⁹	Number not given 2015 average salary numbers by specialty	Data derived from Doximity Specialty, gender	Y/Y Gender composition explained 64% of the variation in salaries among specialties	N/N	N/N
	Sangji (2020) ³⁰	461 Trauma surgeons, members of The Eastern Association for the Surgery of Trauma	Gender and age or practice type (analyzed separately)	Y/Y Fewer women than men made an income of \$300,000 or more (57% vs. 83%)	N/N	N/N
	Shah (2020) ³¹	366 Neurocritical care physicians, members of the Neurocritical Care Society	Multivariable analysis not performed	Y/Y Men's median salary range was \$276,000–\$300,000 compared to women \$251,000–\$275,000	N/N	N/N

(continued)



Table 1. (Continued)

Study references First author name (year)	No. of participants	Population studied	Variables in multivariable analysis	Gender disparities studied/found	Race disparities studied/found	Ethnicity disparities studied/found
Winkelman (2020) ³²	85	Urogynecologists employed at public universities with publicly available salary data	Academic rank, leadership roles, years since residency, gender	Y/Y After adjustment, women made on average \$37,955 less annually	N/N	N/N
Dermody (2019) ¹⁴	260	Otolaryngologists employed at Veterans Affairs Medical Centers with level 1 complexity	Number of years since graduation, h-index, gender, geographic location, faculty rank	Y/N	N/N	N/N
Horowitz (2019) ³³	366	Neonatologists, members of the American Academy of Pediatrics Section on Neonatal-Perinatal Medicine	Gender, geographic region, work with physician assistants, in-house call, years postfellowship, administrative time, daily rounding on critical care patients, clinical time, medical education time, work with neonatal hospitalists, eligibility for annual bonus, large central metropolitan county, academic institution	Y/Y Women's salaries were 3.68% lower in a multivariable model	N/N	N/N
Wiler (2019) ³⁴	7,102	Physicians belonging to academic emergency medicine departments	Gender, academic rank, geographic region, type of hospital, years at faculty appointment, year of survey	Y/Y In an adjusted model, women made significantly less than men	N/N	N/N
Burns (2018) ³⁵	97	Tenure-track faculty on one academic pathology department (Johns Hopkins)	Type of appointment, academic rank, years at rank, gender	Y/N	N/N	N/N
Hoops (2018) ³⁶	86	Surgeons at a single academic institution (Oregon Health & Science University)	Rank, fiscal year, gender	Y/Y Women were compensated significantly less than men: this improved after a compensation plan	N/N	N/N
Morris (2018) ³⁷	44	Surgeons at a single academic medical institution (University of Alabama at Birmingham)	Multivariable analysis not performed	Y/Y Women were compensated significantly less than men despite similar RVUs; this improved after a compensation plan	N/N	N/N
Trotman (2018) ³⁸	2504	Members of the Infectious Diseases Society of America	Employment affiliation or facility type, age, gender	Y/Y Regardless of employment or facility type, women's incomes were lower	N/N	N/N

(continued)



Table 1. (Continued)

Study references First author name (year)	No. of participants	Population studied	Variables in multivariable analysis	Gender disparities studied/Found	Race disparities studied/Found	Ethnicity disparities studied/Found
Kapoor (2017) ³⁹	573	Academic radiologists at 24 public medical schools	Sex, age, faculty rank, years since residency, clinical trial involvement, NIH funding, total Medicare payments, scientific publications, clinical volume, graduation from a top-20 medical school	Y/N	N/N	N/N
Nguyen Le (2017) ⁴⁰ 29,856 in 1990 36,368 in 2000 47,362 in 2010		Physicians from the Integrated Public Use Microdata Series 1990 and 2000 and 2007–2011 ACS (data combined)	Sex, age, race/ethnicity, marital status, number of children, hours worked per week, weeks worked per year, business ownership status	Y/Y After adjustment, the unexplained decrease in women's earnings ranged from 52% to 57%	N/N	N/N
Jagsi (2016) ⁴¹	2,679	Cardiologists from 161 practices	Age range, gender, race/ethnicity, subspecialty, job characteristics including full-time, work RVUs and new patient office visits, patient care breakdown, geographic region, practice composition and other practice factors, practice compensation model	Y/Y After adjustment, women had lower salaries by \$31,749	N/N	N/N
Jena (2016) ⁹	10,241	Academic physicians at 24 public medical schools	Age, sex, experience, specialty, years since residency, faculty rank, NIH funding, clinical trial participation, publication count, medical school attended (top 20 vs. not), Medicare payments, geographic region	Y/Y After adjustment, women had \$19,878 lower salaries	N/N	N/N
Ritter (2016) ⁴²	1878	Infectious disease physicians, members of the Infectious Diseases Society of America	Practice type, gender, age	Y/Y Gender disparities in income span age ranges and practice types and are greatest for solo/owner/partner physicians	N/N	N/N
Manahan (2015) ⁴³	843	Breast surgeons, members of the American Society of Breast Surgeons	Gender, ownership, years of practice, practice type, fellowship training, geographic location, urbanicity, breast surgery case volume and proportion of practice.	Y/Y After adjustment, income was \$8,000 lower for women	N/N	N/N
Spencer (2016) ⁴⁴	848	Urologists, members of the American Urologic Association	Age, gender, work hours, call frequency, practice setting and type, fellowship training, Advance Practice Provider employment	Y/Y After adjustment, women had lower compensation	N/N	N/N

(continued)



Table 1. (Continued)

	Study references First author name (year)	No. of participants	Population studied	Variables in multivariable analysis	Gender disparities studied/found	Race disparities studied/found	Ethnicity disparities studied/Found
	Weaver (2015) ⁴⁵	776	Hospitalists who responded to the 2009–2010 Hospital Medicine Physician Worklife Survey	Gender, leadership role, prioritizes substantial pay, pediatric specialty, practice model, practice region, FTE, days per month of clinical work, daily billable encounters	Y/Y After adjustment, women earned \$14,581 less	N/N	N/N
	Willett (2015) ⁴⁶	241	Internal Medicine program directors, members of the Association of Program Directors in Internal Medicine	Academic rank, career in general internal medicine, age, gender	Y/Y After adjustment, women's salaries were significantly lower	N/N	N/N
	Henderson (2014) ⁴⁷	433	Faculty members within four neurological specialties within one health care system (the University of California)	Institution, academic rank, chair status, specialty, Scopus publication count, Scopus h-index	Y/Y Multivariate regression demonstrated women's salaries were 12% lower	N/N	N/N
	Neither gender nor race/ethnicity analysis performed	Mead (2020) ⁴⁸	1,970	Physicians practicing general orthopedics and seven orthopedic subspecialties who participated in the American Medical Group Association compensation survey	Multivariable analysis not performed—compensation compared against hours worked per week	N/N	N/N
65	Ringel (2019) ⁴⁹	358	Endocrinologists, survey of departments via the Association of Endocrine Chiefs and Directors within the Endocrine Society	Multivariable analysis not performed—compensation compared by academic rank, academic track, leadership position (presented separately)	N/N	N/N	N/N
	Chunn (2020) ⁵⁰	4,830	Cardiologists in the MedAxion Annual Survey 2010–2014	Age category, clinical productivity, ownership model, year of survey, compensation method, subspecialty, employment status, days worked, geographic area	N/N	N/N	N/N
	Eltorai (2018) ⁵¹	Not given	Mean data from 37 specialties, data from the American Medical Colleges Careers in Medicine website	Specialty, hours worked	N/N	N/N	N/N
	Mrak (2018) ⁵²	168	Academic pathologists from 43 departments, survey sent through the Association of Pathology Chairs	Terminal degree(s) with academic rank presented separately from subspecialty with work RVUs	N/N	N/N	N/N

(continued)



Table 1. (Continued)

Study references First author name (year)	No. of participants	Population studied	Variables in multivariable analysis	Gender disparities studied/found	Race disparities studied/found	Ethnicity disparities studied/found
Prakash (2017) ⁵³	Not given	Vascular surgeons whose salary data were contained in the Association of American Medical Colleges and Medical Group Management Association databases	Academic vs. private practice, time	N/N	N/N	N/N
Fijalkowski (2013) ⁵⁴	433	Academic physicians in four specialties in the University of California system	Specialty, institution, ranking, sex, number of publications, h-index	N/N	N/N	N/N
Slakey (2013) ⁵⁵	72	U.S. surgery department chairs	Multivariable analysis not performed—Compensation compared by age, additional degree, specialty, location, contract, tenure, clinical hours, program director status, fellowship training separately	N/N	N/N	N/N

ACS, American Community Survey; FTE, full-time equivalent; HSC, Health System Change; NIH, National Institutes of Health; RVUs, relative value units.

In this review, the pay disparities were often tens of thousands of dollars less annually, which can translate into millions of dollars in lost income and investments throughout one's career.³ Less is known about compensation disparities for physicians who identify with racial or ethnic minority groups; however, large surveys such as Medscape⁴ suggest that disparities exist for people who identify with these groups. In this report, we analyzed physician compensation studies published in medical journals to determine what is known about pay disparities as they relate to gender, race, and ethnicity.

Methods

We searched PubMed on July 1, 2020, for studies on physician compensation published between January 1, 2013, and June 30, 2020. We included studies if they used terms in the title or abstract: "salary" or "compensation" or "wage" or "payment" or "research support" and the term(s) "physician" or "faculty." We excluded studies that did not include U.S. physician compensation, were not in English, were secondary sources (e.g., reviews, perspectives) that did not present novel data, and studies that focused on Medicare payments only or supplementary income (e.g., industry payments, grant awards). IRB approval was not required as all data collected were publicly available.

In a second round of review, we excluded studies that presented data reported as a percentage (percent funding or percent effort) or a partial component of compensation (not total compensation/salary) or billing metrics (e.g., relative value units).

Two authors (A.R.L. and M.J.E.) independently reviewed the 4,563 articles for inclusion and came to consensus on 62 studies that met the initial criteria. Next, two authors (A.R.L. and Q.R.Y.) independently verified the initial inclusion criteria as well as checked for numeric data on total salary/compensation and came to consensus on 46 studies that met the full inclusion criteria, which included an analysis of 47 data sets in total (one study analyzed two data sets separately). We further evaluated each of the 47 data sets to determine specifics of the analyses and findings of disparities by gender, race, and ethnicity.

Results

Twelve data sets conducted a multivariable analysis considering at least gender and race and, in some instances, ethnicity. Three of these studies included race/ethnicity in their multivariable model, but did not consider the impact of these terms on compensation separately. These 12 are reported in the first section of Table 1. One study considered the impact of



gender and race on compensation individually (non-multivariable model). Three studies analyzed ethnicity and race, but not gender, and, of these, two used multivariable models adjusting for covariates. Twenty-three studies collected and analyzed data on gender, but not race or ethnicity. Eight studies did not analyze physician compensation data by gender or race or ethnicity (Table 1 and Fig. 1).

Some studies reported gender, race, or ethnicity within general demographic information on participants or used these data as a confounding variable for adjustment in the analysis. Only those studies that reported the impact of each variable on compensation are listed in Table 1 as having analyzed/studied that variable. Table 2 lists the gender, racial, and ethnic breakdown for each study. For studies that reported these categories as percentages, the numbers are noted to be approximate.

Of the 36 data sets for which compensation was analyzed by gender, 32 found gender-based compensation disparities (Table 1 and Fig. 2). In contrast, 13 data sets were analyzed by race and 4 found race-based compensation disparities. For ethnicity, zero out of eight data sets showed differences between ethnic groups (Fig. 2). The median sample size for the data sets that were analyzed by race and ethnicity was 1,012 and 987.5. The four data sets that revealed dif-

ferences in compensation by race had four of the five largest sample sizes in the group of 13 at 61,327, 41,396, 17,583, and 2,075.

Discussion

In this report, we found that the majority of data sets on physician compensation focus on women and most of these (88.9%) had documented disparities. A smaller number of data sets considered race and/or ethnicity, and of these, four (30.8%) had documented disparities by race.

Our findings are consistent with other reports on gender-related disparities in compensation for physicians.^{2,5} Pay gaps begin early in a physician's career⁶ and persist into the highest echelons of academia.⁷ Documented disparities exist even after accounting for confounding variables, such as years of experience, academic rank, and specialty, among others (Table 1).^{8–12} A recent study showed that research on pay disparities is primarily conducted by women and the majority of this work is unfunded.¹³ Some of the institutions that did not show pay disparities in our study (Table 1) were based on a regimented/formulaic model of compensation,^{14,15} which is one possible approach to address this problem.

Larger studies have reported compensation disparities based on race and/or ethnicity. A 2019 study by

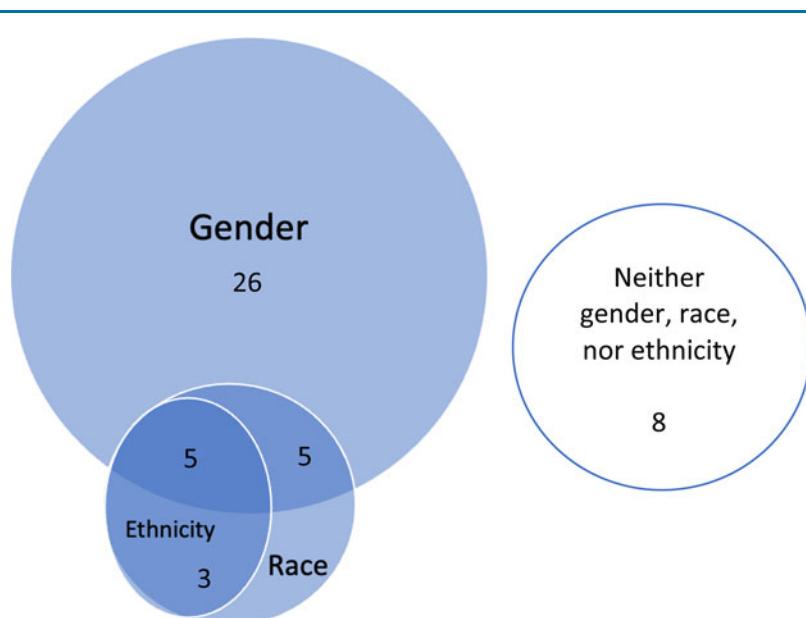


FIG. 1. Of the 47 data sets, 26 analyzed by gender only, 3 by ethnicity and race, 5 by gender and race, and 5 by gender, race, and ethnicity. Eight analyzed none of these.

Table 2. Gender and Racial Breakdown Within Physician Compensation Studies

Study references First author name (year)	No. of participants	Women, n	American Indian or Alaskan Native, n	Asian, n	Black or African American, n	Hawaiian or Pacific Islander, n	Two or more races, n	White, n	Unknown race or other, n	URM ^a , n	Other non-URM ^a , n	Hispanic, n
Hayes (2020) ¹⁵	2,845	861	11	469	57		22	2,120 ^a	3			163
Lo Sasso (2020) ⁶	16,047	7,005	~166	~5,182 ^a	~1,103 ^a			~7,466 ^a				~1,199
Langer (2019)	41,396	~8,859	82	~5,299	~1,532			~33,241				~2,111
Pallant (2019)	149	176	3	17	7			115 ^a				6
Apaydin (2018) ¹¹	439	120	59	9	2			345	4			15
Reid (2018)	374	447	98	54				125				40
Madsen (2017) ¹⁹	1,371	447	98	54				1,066 ^a				153
Freund (2016) ¹⁰	490	239						429 ^a				48
Ly (2016) ¹²	61,327 ^a from ACS survey 17,583 in HSC survey	16,416 4,222		2,950 ^a				58,377 ^a				181
Jagsi (2013) ⁸	6,258	419	250	860 ^a	26			16,723 ^a				48
Seabury (2013)	6,258	419	250	860 ^a	26			688				48
Rosenthal (2017)	157	1,964										
Marcelin (2019) ¹⁶	2,075											
Kaplan (2018)	604											
Lin (2016)	26 in 2004, 38 in 2009, 54 in 2014	309	333	75				1,401	85			47
Cheng (2020)	72	35						529 ^a				28
Gambhir (2020)	170	50										181
Pelley (2020)	Number not given											
Sangji (2020)	461	105	0	29	20			383	10			7
Shah (2020)	366	129	5	93	10			197				32
Winkelman (2020)	89	53										29
Demrody (2019) ⁴	260	63										
Horowitz (2019)	366	168										
Wiler (2019)	7,102	2,412										
Burns (2018)	97	37										
Hoops (2018)	86	24										
Morris (2018)	44	11										
Trotman (2018)	2,504											
Kapoor (2017)	573	171										
Nguyen Le (2017)	29,856 in 1990 36,368 in 2000 47,362 in 2010	6,210 in 1990 9,689 in 2000 15,551 in 2010										
Jagsi (2016)	2,679	229	1	75	~75							
Jena (2016) ⁹	10,241	3,549										
Ritter (2016)	1,878	~751										
Manahan (2015)	843	542										
Spencer (2015)	848	73										
Weaver (2015)	776	263										
Willett (2015)	241	72										
Henderson (2014)	433	98										
Mead (2020)	1,958											
Ringel (2019)	358											
Chunn (2018)	4,830											
Eltorai (2018)												
Mrak (2018)	168											
Prakash (2017)	Not given											
Fijałkowski (2013)	433											
Slater (2013)	72											

^aCategory specifically indicated as non-Hispanic.
URM, underrepresented minority.



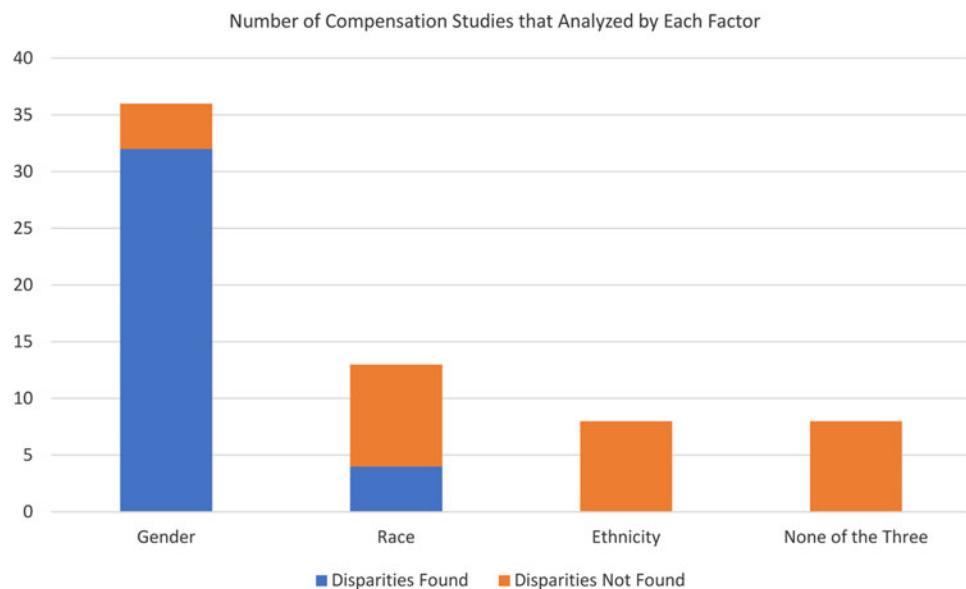


FIG. 2. A total of 88.9% of the studies that analyzed by gender found disparities in compensation. A total of 30.7% of the studies that analyzed by race and 0% of the studies that analyzed by ethnicity found disparities.

Medscape on 19,328 U.S. physicians found that Caucasian physicians receive the highest compensation and African American physicians the lowest.⁴ This racial disparity persisted after adjusting for specialty.⁴ Ly et al. compared the income of White and Black physicians within two large data sets and found that White men made significantly higher compensation than Black men and that, while women physicians made significantly lower income than men physicians, there was no statistically significant difference in compensation for White compared with Black women.¹² This finding was the same for both data sets they considered.¹²

Marcelin et al. analyzed unadjusted data from a national society report on compensation and found lower compensation for African American physicians within the society.¹⁶ The authors mentioned that the relatively small number of physicians from underrepresented racial or ethnic groups limited the analysis¹⁶—a common problem for many compensation studies and databases.

Disparities in rates of promotion can compound compensation disparities. Promotional gaps exist for women physicians.¹⁷ These are present after adjusting for age, experience, research productivity, and other factors.¹⁸ Studies have also shown differences in academic rank based on race.¹⁹ Multivariable compensation studies often adjust for academic rank since compensation is expected

to be higher with ascending rank. It is therefore important to consider the additive effect promotional disparities can have on differences in compensation.

Limitations

This study is limited to articles published in the English language and reported in PubMed, as well as by the search terms used to discover these articles.

Conclusion

In conclusion, the majority of reports on physician compensation analyzed for and discovered disparities based on gender. A minority of compensation articles considered disparities based on race and/or ethnicity and this analysis was often limited by a small sample size. Disparities in compensation for racial/ethnic minority groups are understudied and further research is needed.

Author Disclosure Statement

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Abbreviations Used

- ACS = American Community Survey
FTE = full-time equivalent
HSC = Health System Change
NIH = National Institutes of Health
RVUs = relative value units
URM = underrepresented minority

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