

RESEARCH ARTICLE

Religious service attendance and mortality among older Black men

Marino A. Bruce^{1,2,3,4*}, Bettina M. Beech^{1,2,3,4}, Dulcie Kermah⁵, Shanelle Bailey⁵, Nicole Phillips⁶, Harlan P. Jones⁶, Janice V. Bowie^{1,4,7}, Elizabeth Heitman^{1,8}, Keith C. Norris^{1,4,9}, Keith E. Whitfield^{4,10}, Roland J. Thorpe^{1,4,7}

1 Faith, Justice and Health and Men's Health Collaboratories, University of Houston Population Health, University of Houston, Houston, TX, United States of America, **2** Department of Behavioral and Social Science, University of Houston Tilman J. Fertitta Family College of Medicine, Houston, TX, United States of America, **3** Department of Health Systems and Population Health Sciences, University of Houston Tilman J. Fertitta Family College of Medicine, Houston, TX, United States of America, **4** Program for Research on Men's Health, Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States of America, **5** Charles R. Drew University School of Medicine and Science, Los Angeles, CA, United States of America, **6** Department of Microbiology, Immunology and Genetics, University of North Texas Health Science Center, Fort Worth, TX, United States of America, **7** Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, United States of America, **8** Program Ethics in Science and Medicine, University of Texas Southwestern Medical Center, Dallas, TX, United States of America, **9** David Geffen School of Medicine at UCLA, Los Angeles, CA, United States of America, **10** University of Nevada-Las Vegas, Las Vegas, Nevada, United States of America

* mabruce@central.uh.edu



OPEN ACCESS

Citation: Bruce MA, Beech BM, Kermah D, Bailey S, Phillips N, Jones HP, et al. (2022) Religious service attendance and mortality among older Black men. PLoS ONE 17(9): e0273806. <https://doi.org/10.1371/journal.pone.0273806>

Editor: Takeru Abe, Yokohama City University, JAPAN

Received: November 19, 2021

Accepted: August 16, 2022

Published: September 2, 2022

Copyright: © 2022 Bruce et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: NHANES III data are publicly available and de-identified. These data can be downloaded at <https://wwwn.cdc.gov/nchs/nhanes/nhanes3/datafiles.aspx>.

Funding: FTC: PONE-D-21-35202R1 PONE-D-21-18136R3 PONE-D-22-15262R1 PONE-D-21-12768R2 PONE-D-22-05585R2 PONE-D-21-25497R2 PONE-D-21-32955R3 PONE-D-22-02710R1 PONE-D-21-38460R3 PONE-D-22-07522R1 PONE-D-22-12448R2 This work was supported in part by National Institute on Aging, K02AG059140-02S1, Dr. Marino A. Bruce, National

Abstract

Religious institutions have been responsive to the needs of Black men and other marginalized populations. Religious service attendance is a common practice that has been associated with stress management and extended longevity. The objective of this study was to examine the relationship between religious service attendance and all-cause mortality among Black men 50 years of age and older. Data for this study were from NHANES III (1988–1994). The analytic sample (n = 839) was restricted to participants at least 50 years of age at the time of interview who self-identified as Black and male. Mortality was the primary outcome for this study and the NHANES III Linked Mortality File was used to estimate race-specific, non-injury-related death rates using a probabilistic matching algorithm, linked to the National Death Index through December 31, 2015, providing up to 27 years follow-up. The primary independent variable was religious service attendance, a categorical variable indicating that participants attended religious services at least weekly, three or fewer times per month, or not at all. The mean age of participants was 63.6±0.3 years and 36.4% of sample members reported that they attended religious services one or more times per week, exceeding those attending three or fewer times per month (31.7%), or not at all (31.9%). Cox proportional hazard logistic regression models were estimated to determine the association between religious service attendance and mortality. Participants with the most frequent religious service attendance had a 47% reduction of all-cause mortality risk compared their peer who did not attend religious services at all (HR 0.53, CI 0.35–0.79) in the fully adjusted model including socioeconomic status, non-cardiovascular medical conditions, health behaviors, social support and allostatic load. Our findings underscore the

Institute on Aging, P30AG059298, Dr. Marino A. Bruce, Dr. Janice V. Bowie, Dr. Roland J. Thorpe, Jr., National Heart, Lung, and Blood Institute, R25HL126145, Dr. Marino A. Bruce, Dr. Bettina M. Beech, Dr. Elizabeth Heitman, Dr. Keith C. Norris, Dr. Roland J. Thorpe, Jr., National Institute on Aging, K02AG059140-04S1, Dr. Bettina M. Beech, National Institute on Minority Health and Health Disparities, P20MD000182, Dr. Keith C. Norris, National Center for Advancing Translational Sciences, UL1TR000124, Keith C. Norris, National Institute on Aging, P30AG021684, Dr. Keith C. Norris, National Institute on Aging, K02AG059140, Dr. Roland J. Thorpe, Jr., National Institute on Minority Health and Health Disparities, U54MD000214, Dr. Janice V. Bowie, Dr. Roland J. Thorpe, Jr. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. The authors declare no financial disclosures or conflicts of interest.

Competing interests: The authors have declared that no competing interests exist.

potential salience of religiosity and spirituality for health in Black men, an understudied group where elevated risk factors are often present.

Introduction

Despite unparalleled discovery in biomedical science and advances in clinical medicine, Black men in the United States continue to be disproportionately burdened by the early onset and accelerated progression of chronic diseases as well as disproportionately high levels of illness and complications from a wide array of health conditions [1–10]. The health and social challenges Black men perpetually face contribute to the truncated lifespan of this population. The poor health profile among this population have been noted in public discourse; however, a remarkably small number of investigators have explicitly examined morbidity and mortality among Black men [1,4,6,11]. The poor health and premature death of Black men is expensive as medical care expenditures and lost productivity cost have been estimated to be nearly \$200 billion dollars [12].

Early work examining patterns of poor health and premature mortality among Black men focused primarily on maladaptive, health-compromising behavioral risk factors and social conditions (e.g., violence, unprotected sex, drug misuse). Although important, behavior is only one set of factors potentially contributing to disproportionate levels of premature mortality among this population. A growing number of health scientists have also begun to consider sociologic and psychologic factors potentially contributing to the early onset of disease and death among Black men. Recent studies have implicated stress as a major contributor to Black men's health profiles [3,8,10,13–15]. Black men have been oppressed, commodified, surveilled, and criminalized like no other group in US history and they often experience disproportionately high levels of social and psychological stress from structural racism, institutional discrimination, and unfair treatment from early childhood through late adulthood [9,10,16]. The rapid accumulation and persistence of these stressors throughout the lifecourse are thought to be associated with increased mortality among Black men beginning as early as midlife [17,18]. Data from recent studies among the general population indicate that chronic stress contributes to activation of inflammatory processes, among others, leading to the onset and progression of chronic diseases; however, this and other pathways to disease development, disability, and premature mortality have not been well-explored, especially in Black men [9].

Current health promotion and disease prevention strategies incorporate stress management into protocols; however, few studies have examined how Black men cope with stress or assess how their coping strategies have implications for health outcomes [2,9]. A recent qualitative study of 150 Black men found that prayer or reading passages from sacred books were often used to cope with stressful circumstances [2]. Such practices, often referred to as *religiosity*, tend to be associated with social, doctrinal, and denominational characteristics of an organized religion [19,20]. Religious institutions under Black leadership are organizations in which Black men have been welcomed and serve as safe places for them to receive spiritual, social, emotional, and economic resources to help them cope with hostile and stressful social environments [9,21]. Attending religious services is a common form of religiosity among individuals later in the life [22–24]. This pattern is particularly salient for Black men because religious service attendance is highest during middle and late life for this group [9]. It is also noteworthy that recent studies have found religious service attendance among older Black men to be considerably higher than their White peers [25,26]. Religious service attendance has been

associated with reduced mortality among adults in the general population [27–31] yet, very few studies have explicitly examined the relations between religiosity and health among Black men during middle and late life [9,26]. The purpose of this study is to examine the association between religious service attendance and all-cause mortality for middle- and older-age Black men in a nationally representative sample of adults in the US. We hypothesized that increased attendance of religious services is associated with a lower mortality rate among Black men.

Materials and methods

Survey design and data collection

The sample of Black men for this study was drawn from the Third National Health and Nutrition Examination Survey (NHANES III), a nationally representative sample of civilian, non-institutionalized persons from 89 random locations across the United States [32]. Respondents were selected and recruited using a stratified, multistage probability sampling design and their data were collected in two stages. Physical measurements and blood samples for laboratory analyses were collected during a study visit at the NHANES mobile examination center [33]. Social and demographic data were collected during a household interview. Data in NHANES III were collected between 1988–1994 in two phases (1988–1991 and 1991–1994), and included long-term follow-up, allowing for a robust assessment of mortality. NHANES III data are publicly available and de-identified. Analyses using these data are not classified as human subjects research and not subject to IRB review.

Our study population was comprised of middle-age and older (at least 50 years of age at the time of interview [34]) males in NHANES III who self-identified as Black. Participants whose records were missing data on religious service attendance or two or more components of the allostatic load score (detailed below) were excluded. The analytic sample size for the study was 837 and the algorithm used to define the study cohort is depicted in Fig 1.

Study variables

Mortality was the primary outcome for this study and the NHANES III Linked Mortality File was used to estimate race-specific, non-injury-related death rates for NHANES III participants using a probabilistic matching algorithm, linked to the National Death Index through December 31, 2015 [35] and provided up to 27 years follow-up (mean [SE]: 16 [0.2] years).

Religious service attendance was the primary independent variable of interest and was derived from an interview question asking respondents “How often do you attend church or religious services? (per year)”. The responses ranging from 0 to 1095 times a year were divided by 12 and classified into three categories, never attended, attended three or fewer times per month, and attended one or more times per week [27,28].

Allostatic load (AL) was calculated as a summative measure derived from values for 10 clinical/biologic variables available in NHANES III, which included cardiovascular measures (systolic blood pressure, diastolic blood pressure, total cholesterol/high density lipoprotein (HDL) ratio, homocysteine); nutritional/inflammatory markers (albumin, C-reactive protein); and metabolic (waist-hip ratio, glycated hemoglobin) biomarkers associated with physiologic dysregulation [36,37]. Dichotomous variables for each clinical/biological variable were derived to indicate high or low risk. Values above the 75th percentile were defined as high risk and coded “1” for all biomarkers except HDL and albumin. High risk for these biomarkers were values below the 25th percentile. The sum of the biomarker indicator variables with equal weighting was used to compute the total allostatic score with a range from 0–10 [38]. Age was a continuous variable derived from an item asking respondents to report their age in years.

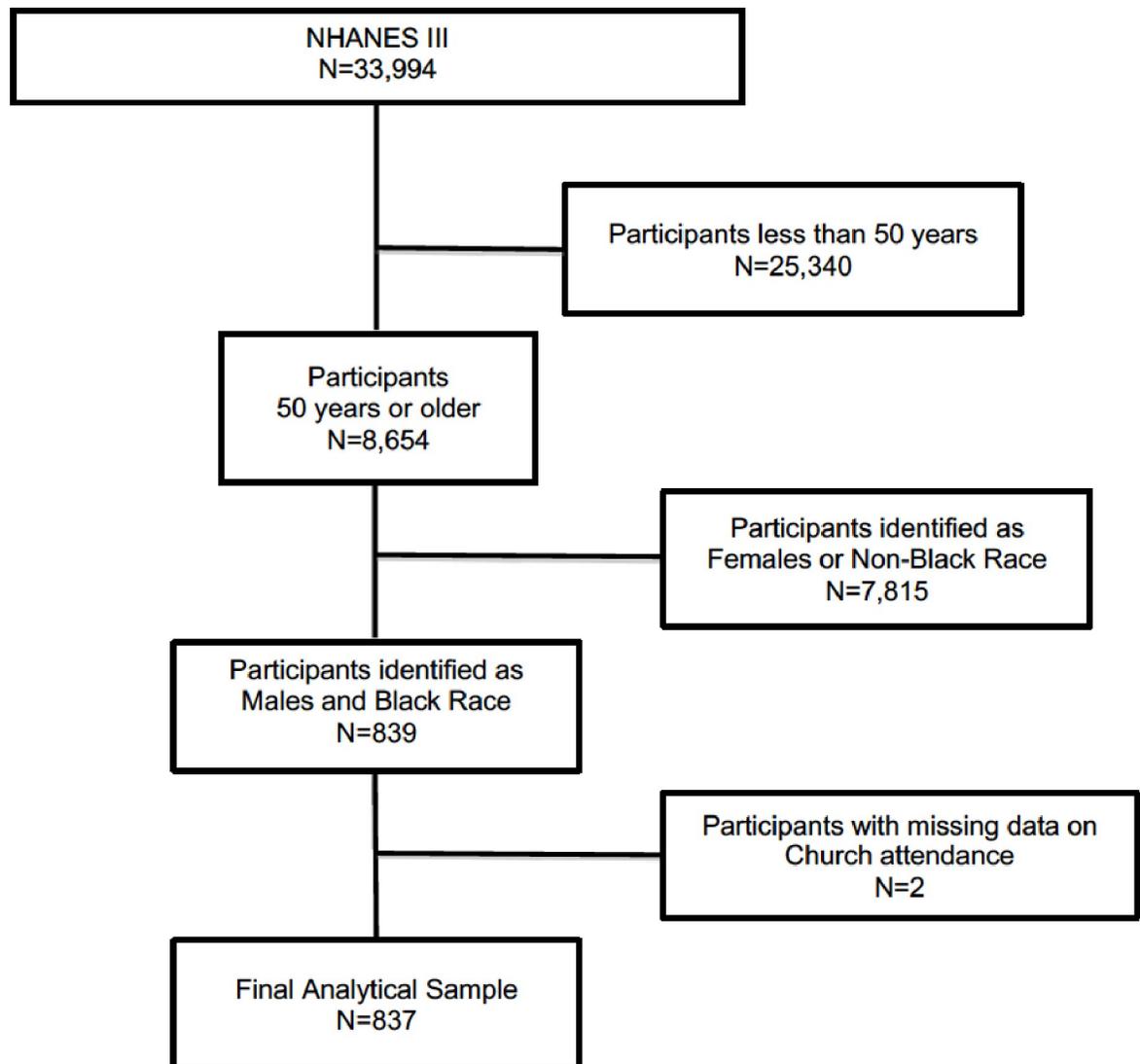


Fig 1. Algorithm used to define the study cohort.

<https://doi.org/10.1371/journal.pone.0273806.g001>

Variables were also included to adjust for socioeconomic, behavioral, health, and social support factors that have been shown to be related to mortality [27,36]. The socioeconomic variables were education, health insurance, and income. Education was categorized as three variables denoting whether an individual completed <9, 9–12, or >12 years of education. Health insurance was coded as a dichotomous variable indicating whether or not a participant was insured. Income was measured by the poverty-income ratio [39], an income-to-needs variable measuring the ratio of household income to the US poverty threshold based on each respondent's family size and composition at the time of the NHANES III examination [27,36]. Physical activity (any vs. none), smoking status, (current, former, never), alcohol use (non-drinker, 1–30 drinks/month, >30 drinks per month), and the Healthy Eating Index (HEI) [36] were behavioral variables. The health variables were self-report measures indicating whether respondents were told by a clinician that they had asthma, chronic obstructive pulmonary disease, non-skin cancer, thyroid disease, and rheumatoid arthritis as well as self-rated health.

Self-rated health was assessed with a single item, “How would you rate your overall health?” with categories ranging from excellent to poor [30,40]. In this study self-rated health was categorized into three groups: “Excellent or Very Good”, “Good”, and “Fair or Poor” [30]. Social support measures for this study were drawn from questionnaire items asking respondents: a) “In a typical week, how many times do you talk on the telephone with family, friends, or neighbors?”, b) “How often do you get together with friends or relatives; I mean things like going out together or visiting in each other’s homes? (per year)”, c) “About how often do you visit with any of your other neighbors, either in their homes or in your own? (per year)” [27]. The natural logarithmic transformation of each social support variable was used in our analyses to compensate for skewness.

Statistical analyses

Study population characteristics were described for the total sample and by church attendance, using means and standard errors for continuous variables and proportions for categorical variables. Cox proportional hazards analyses were used to generate hazard ratios (HR) and 95% confidence intervals (CI) for the total sample to examine the association between the level of church attendance and all-cause mortality among Black men. Model 1 included adjustment for race, age, sex, and non cardiovascular-related chronic conditions (asthma, chronic obstructive pulmonary disease, non-skin cancer, thyroid disease, rheumatoid arthritis), Model 2 added SES (education, poverty-income ratio, and health insurance status), to Model 1. Model 3 added health behaviors (smoking status, alcohol use, physical activity, and HEI) to Model 2. Model 4 added allostatic load score to Model 3, and Model 5 added self-rated health and social support indicators to Model 4. Adjusted survival curves for each attendance category were plotted using the Kaplan-Meier estimator and compared with the log-rank test.

NHANES III has a complex sampling design and all estimates were weighted to adjust for the differential probabilities of sampling and non-response, to represent the total civilian, non-institutionalized US population [41]. A p-value <0.05 was considered statistically significant. Final analyses were performed using SAS software V.9.4 (SAS Institute, Cary, North Carolina, USA), SUDAAN software Release 11.0.3 (SUDAAN Statistical Software Center, Research Triangle Park, North Carolina, USA), and STATA 16 (StataCorp, College Station, Texas).

Results

The baseline characteristics of men in the study are provided in Table 1. All study participants were at least 50 years of age, with a mean cohort age of 63.6 ± 0.3 years. Over one-third of study participants (36.4%) reported that they attended religious services one or more times per week exceeding that of the other two attendance categories [3 or fewer times per month (31.7%), no attendance (31.9%)]. Black men with the most frequent religious service attendance were socioeconomically distinct from those who attended less frequently or not all. The proportion of respondents who reported attending religious services at least once per week was considerably greater than the other attendance categories among those reporting some college experience (23.7% vs 12.7% or 10.2%). Among respondents classified as poor, the proportion of individuals who attended religious service attendance one or times per week (49.5%) was considerably smaller than the segment of sample members in the other attendance categories (60.0%, 65.4%). The results in Table 1 indicate that Black men in the study who attended religious services at least once per week had a better overall health behavior profile than those who did not attend religious services. The proportion of never smokers (27.7%) and non-drinkers (63.1%) was highest among Black men who attended religious services at least once per week. The attendees of religious services at least once per week had the largest

Table 1. Baseline characteristics of Black Men 50 and older in NHANES III by self-reported religious service attendance.

	Total Sample (n = 837)	1+ times per week (n = 305)	≤ 3 times per month (n = 265)	No attendance (n = 267)	P
Mean age (yrs) [Mean (SE)]	63.6 (0.3)	63.9 (0.7)	63.3 (0.6)	63.7 (0.7)	0.854
Mean allostatic load score [Mean (SE)]	3.2 (0.1)	3.2 (0.1)	3.3 (0.1)	3.1 (0.1)	0.74
Education [n,%]					<0.001
<High school	363 (38.1)	112 (31.1)	123 (40.6)	127 (43.8)	
High school/GED	353 (45.9)	136 (45.2)	107 (46.7)	110 (46.0)	
Some college +	109 (16.0)	56 (23.7)	28 (12.7)	25 (10.2)	
Poor (poverty-income ratio<2) [n,%]	467 (58.0)	146 (49.5)	152 (60.0)	168 (65.4)	0.001
No health insurance [n,%]	45 (6.3)	16 (5.4)	13 (6.5)	16 (7.0)	0.719
Self-rated health [n,%]					0.007
Excellent/Very good	209 (26.3)	81 (28.7)	70 (27.7)	58 (22.7)	
Good	291 (35.6)	123 (41.3)	81 (31.0)	86 (33.2)	
Fair/Poor	339 (38.1)	101 (30.1)	114 (41.3)	123 (44.1)	
Smoking [n,%]					<0.001
Never smoker	209 (25.2)	84 (27.7)	75 (30.7)	50 (17.4)	
Former smoker	344 (39.4)	156 (50.1)	94 (31.8)	94 (34.6)	
Current smoker	285 (35.4)	65 (22.2)	96 (37.5)	123 (48.0)	
Physically active [n,%]	485 (59.8)	201 (67.0)	168 (65.2)	116 (47.0)	<0.001
Alcohol use [n,%]					<0.001
Non-drinkers	463 (51.5)	203 (63.1)	135 (46.4)	125 (43.5)	
1–30 drinks/month	303 (39.5)	98 (35.5)	103 (43.0)	101 (40.6)	
>30 drinks/month	71 (9.0)	4 (1.4)	27 (10.6)	39 (15.9)	
HEI score [Mean (SE)]	58.8 (0.5)	61.6(0.8)	57.5(0.8)	57.0(0.9)	<0.001
Non CV comorbidities [n,%]					
Lung disease	70 (7.6)	22 (6.2)	16 (5.4)	31 (10.8)	0.016
Cancer	44 (4.9)	15 (5.1)	15 (5.2)	14 (4.6)	0.942
Thyroid disease	17 (1.8)	7 (2.2)	5 (1.4)	5 (1.7)	0.721
Rheumatoid arthritis	52 (6.0)	18 (5.7)	14 (4.8)	20 (7.7)	0.322
Asthma	51 (6.9)	14 (6.9)	17 (6.4)	20 (7.5)	0.938
Social support [Mean (SE)]					
Number of phone calls with family, friends, or neighbors/week	9 (1.0)	7 (1)	10 (1)	14 (1)	0.01
Number of visits with friends or relatives/year	69 (1.0)	71 (1)	71 (1)	64 (1)	0.6
Number of visits with other neighbors/year	83 (1.0)	71 (1)	97 (1)	88 (1)	0.2

^aEstimate is unreliable, as the sample size was smaller than that recommended in the NHANES analytic guidelines for the design effect and estimated proportion [22,23].

The data presented are the weighted percentages, which may not add up to 100.

SE: Standard error; CV-cardiovascular; HEI—Healthy Eating Index; GED- General Educational Diploma; NHANES III- Third National Health and Nutrition Examination Survey.

<https://doi.org/10.1371/journal.pone.0273806.t001>

segment of individuals being physically active (67.0% vs 65.2% or 47.0%) and the highest mean Healthy Eating Index scores (61.5 ± 0.8 vs 57.5 ± 0.8 or 57.0 ± 0.9). Only one of the social support variables had notable association with religious service attendance: Black men in the study who attended religious services at least once per week averaged fewer weekly phone calls with family, friends, and (7.0 ± 1.0) than those who attended 3 or fewer times per month (10.0 ± 1.0) or not at all (14.0 ± 1.0).

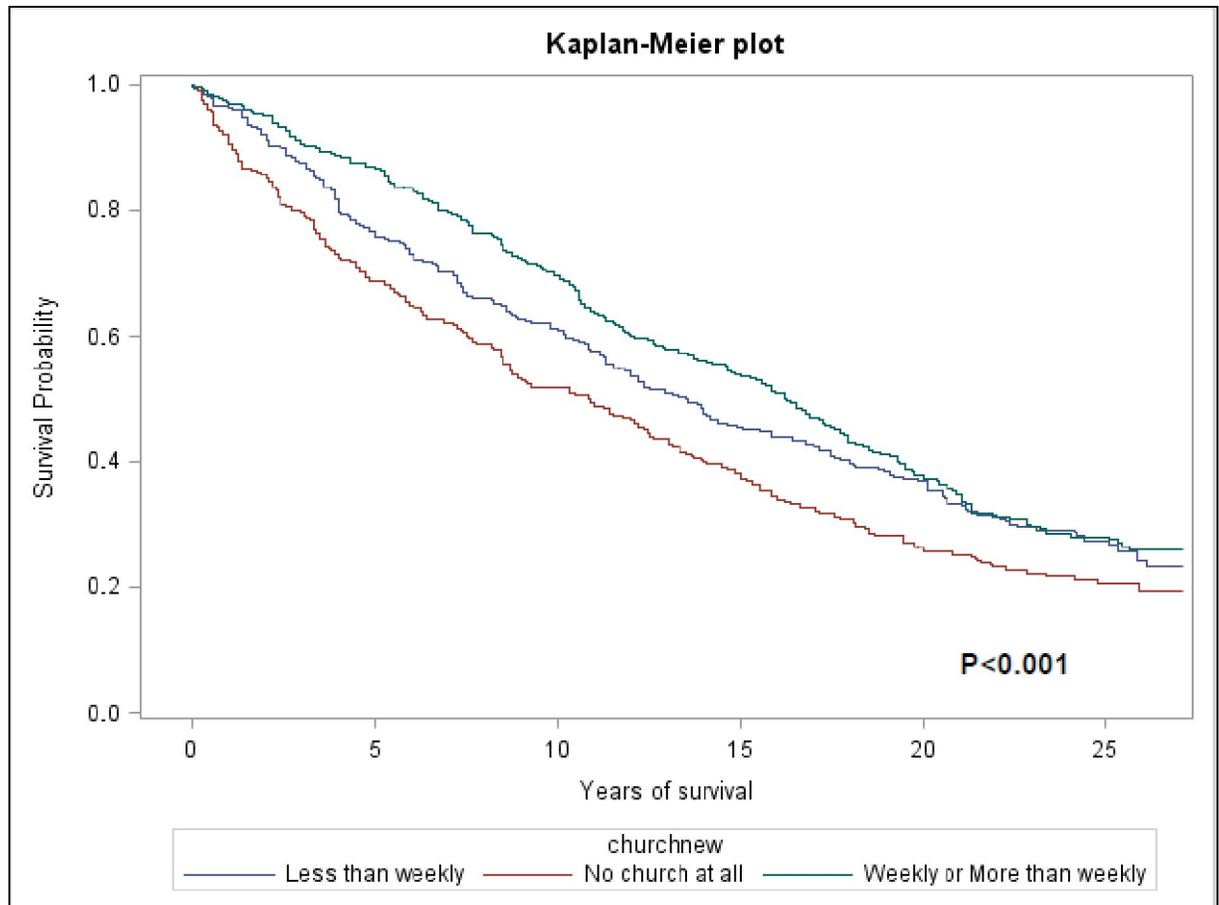


Fig 2. Unadjusted Kaplan-Meier curves for all-cause mortality by church attendance.

<https://doi.org/10.1371/journal.pone.0273806.g002>

The association between religious service attendance and all-cause mortality among Black men is displayed in Fig 2 and Table 2. The unadjusted Kaplan-Meier curves presented in Fig 2 indicate that survival was highest among Black men who attended religious services at least weekly and lowest among those who did not attend at all. Black men who attended religious

Table 2. Hazard ratios for all-cause mortality by religious service attendance for Black Men 50 and older in NHANES III.

	Unadjusted	Adjusted			
		Model 1	Model 2	Model 3	Model 4
No attendance	Reference	Reference	Reference	Reference	Reference
Attendance 3 or fewer times/month	0.79 (0.64–0.96)	0.76 (0.57–1.02)	0.83 (0.61–1.11)	0.70 (0.46–1.07)	0.70 (0.46–1.07)
Attendance one or more times/week	0.71 (0.58–0.86)	0.59 (0.44–0.77)	0.62 (0.45–0.85)	0.51 (0.33–0.78)	0.53 (0.35–0.79)

NHANES III—Third National Health and Nutrition Examination Survey.

- Model 1 adjusts for age, asthma, chronic obstructive pulmonary disease, non-skin cancer, thyroid disease, rheumatoid arthritis, social support, and self-rated health.
- Model 2 adds education, poverty-income ratio, and health insurance status to the covariates in Model 1.
- Model 3 adds health behaviors and the healthy eating index score to the covariates in Model 2.
- Model 4 adds allostatic load score to the covariates in Model 3.

<https://doi.org/10.1371/journal.pone.0273806.t002>

services at least one per week had a lower risk for all-cause mortality than sample members who did not attend religious services across all of the hazard models presented in [Table 2](#). Black men who attended religious services at least once per week had a highly statistically significant HR of 0.53 (95% CI: 0.35–0.79) for all-cause mortality relative to those who did not attend religious services, after adjusting for health, socioeconomic, behavioral, allostatic load, and social support.

Discussion

Advances in science and healthcare have allowed individuals in the United States to live longer; however, the life expectancy for Black men remains significantly shorter than for other groups of women and men [42]. Religious service attendance has been associated with improvements in well-being and extended longevity, especially in later life [27]. Our study is the first study to examine association between religious service attendance and mortality risk in a sample of Black men in the United States who are at least 50 years of age. We found that Black men who attended religious services at least once a week had a lower mortality risk than their peers who did not attend religious services. This association was minimally impacted by adjustment for demographic, social, economic, behavioral, and clinical variables, including allostatic load. These findings emphasize the potential independent role of faith-related practices for extending life for Black men during middle and later life.

Our findings are consistent with other studies demonstrating religious service attendance to be associated with lower mortality risk in general populations [27,29,43]. This is important because our study is one of a few studies examining the degree to which religiosity is salutary for Black men's health and longevity. Black religious institutions have been responsive to an array of individual and community needs, suggesting that the association between frequency of religious service attendance and mortality among middle-age and older Black men can be attributed to multiple factors. Black men tend to have an earlier onset of chronic diseases, more aggressive disease progression, and more complications than other groups of men. Chronic disease can present multiple stressors including burdensome therapeutic protocols and the loss of income, productivity, and quality of life [21,44]. It has been suggested that religious settings and services present opportunities for individuals to have spiritually enriching experiences and to receive emotional support and affirmative messages useful for coping with the uncertainty, vulnerability, hopelessness, fear, anger, and particularly depression that can accompany chronic conditions [21,26,45]. Religious institutions can also be sources of social and economic support to obtain important health information and services [9,46,47]. The impact of attending religious services on physiological processes and clinical outcomes among individuals with chronic health conditions is not clear; however, our results suggest that future studies are critically needed examining the influence that close association with a religious body can have on health and longevity of among marginalized populations with chronic conditions.

Black religious institutions can also be contexts for promoting resiliency and resistance against forces such as the structural racism that is often the primary source of discriminatory practices that adversely impact the lives of Black men. Black houses of worship have traditionally been in unique positions to advocate for Black communities and residents because they are one of few social institutions built, financed, and controlled by Black leadership [48–50]. This independence has allowed them to advocate for the communities they serve. Black religious institutions guided by theological perspectives in which liberation from oppression is a central tenet have been influential in collective actions large and small [51–53]. Regular engagement in communities with this orientation can buffer the impact of marginalization,

foster a sense of connection with others [54,55], and instill meaning and purpose regardless of life circumstances [27,56]. Affirmative environments can also encourage personal or individual-level religious practices (e.g., prayer, meditation) that can reduce stress and mitigate maladaptive biological (e.g., elevated blood pressure) and behavioral (e.g., substance abuse) responses often associated with the onset, progression, and complications of chronic disease. Recent studies have presented evidence suggesting that prayer, meditation, and personal religious or spiritual practices can be effective for treating post-traumatic stress disorder [57], reduce cardiovascular disease risks [58–61], and potentially prolong longevity [27,62].

Our findings underscore the potential salience of religiosity and spirituality for health in Black men, a group that has been understudied and where elevated risk factors are often present. This study contributes to the existing body of minority health and men's health research; however, it has some noteworthy limitations. Religious service attendance has been used as a proxy for religious practice; however, it is a single outward expression of religiosity. Our study does not account for private practices such as prayer or reading sacred texts nor the heterogeneity of religious services across and within denominations or sects [63]. We adjusted for known risk factors associated with mortality, including major medical conditions and allostatic load, but we could not account for residual confounding such as risk factor severity or duration, depression, religious affiliation or other unmeasured factors in the model. At the writing of this manuscript, the National Death Index match only goes through 2015. Data used for this study are observational and causality cannot be inferred from our findings. Our research includes self-report data, and limitations such as recall bias and social desirability apply.

Despite these limitations, our study demonstrates a powerful association with reduced mortality that, after adjusting for common mortality risk factors, supports the potential survival benefits of attending religious services for middle age and older Black men. Data from this research provides some intriguing avenues of inquiry at the interface of religiosity, spirituality, and health. Nuanced considerations of factors such as racism, gender, status in society, stress, religious participation, and religious coping lay the foundation for the next generation of studies investigating how religious participation and other forms of religiosity and spirituality can get “under the skin” to influence physiological and cognitive functioning as well as promote longevity among Black men and other populations that have been historically marginalized.

Acknowledgments

The authors would like to acknowledge the support of the Faith, Justice, and Health Collaboratory Board of Advisors, Reverend Reginald Buckley, Reverend Pailleatha Bruce, Dr. Mary Crump, Reverend Linda Davis, Reverend Timothy Poston, and Deacon James Williams.

Author Contributions

Conceptualization: Marino A. Bruce, Roland J. Thorpe.

Formal analysis: Dulcie Kermah, Shanelle Bailey.

Methodology: Marino A. Bruce.

Project administration: Marino A. Bruce.

Writing – original draft: Marino A. Bruce, Bettina M. Beech, Dulcie Kermah, Shanelle Bailey, Nicole Phillips, Harlan P. Jones, Janice V. Bowie, Elizabeth Heitman, Keith C. Norris, Keith E. Whitfield, Roland J. Thorpe.

Writing – review & editing: Marino A. Bruce, Bettina M. Beech, Dulcie Kermah, Nicole Phillips, Harlan P. Jones, Janice V. Bowie, Elizabeth Heitman, Keith C. Norris, Keith E. Whitfield, Roland J. Thorpe.

References

1. Bruce MA, Griffith DM, Thorpe RJ Jr., Social Determinants of Men's Health Disparities. *Fam Community Health*. 2015; 38(4):281–3. <https://doi.org/10.1097/FCH.000000000000083> PMID: 26291188.
2. Ellis KR, Griffith DM, Allen JO, Thorpe RJ Jr., Bruce MA. "If you do nothing about stress, the next thing you know, you're shattered": Perspectives on African American men's stress, coping and health from African American men and key women in their lives. *Soc Sci Med*. 2015; 139:107–14. Epub 2015/07/18. <https://doi.org/10.1016/j.socscimed.2015.06.036> PMID: 26183018; PubMed Central PMCID: PMC4519397.
3. Thorpe RJ Jr., Kennedy-Hendricks A, Griffith DM, Bruce MA, Coa K, Bell CN, et al. Race, Social and Environmental Conditions, and Health Behaviors in Men. *Fam Community Health*. 2015; 38(4):297–306. <https://doi.org/10.1097/FCH.000000000000078> PMID: 26291190; PubMed Central PMCID: PMC5052072.
4. Thorpe RJ Jr., Wilson-Frederick SM, Bowie, Coa K, Clay OJ, LaVeist TA, et al. Health behaviors and all-cause mortality in African American men. *American journal of men's health*. 2013; 7(4 Suppl):8S–18S. <https://doi.org/10.1177/1557988313487552> PMID: 23649171; PubMed Central PMCID: PMC4086642.
5. Bonhomme J, Young A. The health status of black men. In: Braithwaite RL, Taylor SE, Treadwell HM, editors. *Health issues in the black community*, 3rd Edition. San Francisco, CA: Jossey Bass; 2009. p. 73–94.
6. Griffith DM. An Intersectional Approach to Men's Health. *Journal of Men's Health*. 2012; 9(2):106–12.
7. Williams DR. The health of men: structured inequalities and opportunities. *Am J Public Health*. 2003; 93(5):724–31. <https://doi.org/10.2105/ajph.93.5.724> PMID: 12721133; PubMed Central PMCID: PMC1447828.
8. Brown TH, Hargrove TW. Psychosocial Mechanisms Underlying Older Black Men's Health. *The Journals of Gerontology: Series B*. 2017; 73(2):188–97. <https://doi.org/10.1093/geronb/gbx091> PMID: 28977648
9. Bruce MA, Thorpe RJ Jr. Stress, faith, and health among African American middle-age and older Men. *Annual Review of Gerontology and Geriatrics*. 2019; 39(1):123–32.
10. Thorpe RJ Jr, Cobb R, King K, Bruce MA, Archibald P, Jones HP, et al. The association between depressive symptoms and accumulation of stress among Black men in the Health and Retirement Study. *Innovation in aging*. 2020; 4(5):igaa047. <https://doi.org/10.1093/geroni/igaa047> PMID: 33354627
11. Griffith DM, Bruce MA, Thorpe RJ Jr. *Men's Health Equity*. New York: Routledge; 2019.
12. Thorpe RJ Jr., Richard P, Bowie JV, LaVeist TA, Gaskin. Economic burden of men's health disparities in the United States. *International Journal of Men's Health*. 2013; 12(3):195–212.
13. Bruce MA, Wilder T, Norris KC, Beech BM, Griffith DM, Thorpe RJ J, Perspective: Cardiovascular Disease among Young African American Males. *Ethn Dis*. 2017; 27(4):363–6. Epub 2017/12/12. <https://doi.org/10.18865/ed.27.4.363> PMID: 29225435; PubMed Central PMCID: PMC5720944.
14. Thorpe RJ Jr, Bell CN, Kennedy-Hendricks A, Harvey J, Smolen JR, Bowie JV, et al. Disentangling Race and Social Context in Understanding Disparities in Chronic Conditions among Men. *Journal of urban health: bulletin of the New York Academy of Medicine*. 2015; 92(1):83–92. <https://doi.org/10.1007/s11524-014-9900-9> PMID: 25168686.
15. Thorpe RJ Jr, Kelley E, Bowie JV, Griffith DM, Bruce M, LaVeist T. Explaining Racial Disparities in Obesity Among Men: Does Place Matter? *Am J Mens Health*. 2014. <https://doi.org/10.1177/1557988314551197> PMID: 25249452.
16. Thorpe RJ Jr, Norris KC, Beech BM, Bruce MA. Racism across the life course. In: Ford CL, Griffith DM, Bruce MA, Gilbert KL, editors. *Racism: Science and tools for the public health professional*. Washington, DC: American Public Health Association; 2019. p. 209–19.
17. Jackson JS, Hudson D, Kershaw K, Mezuk B, Rafferty J, Tuttle KK. Discrimination, chronic stress, and mortality among black Americans: A life course framework. *International handbook of adult mortality*: Springer; 2011. p. 311–28.
18. Pollard K, Scommegna P. The health and life expectancy of older Blacks and Hispanics in the United States. *Population Reference Bureau*. 2013; 28:1–8.

19. Institute Fetzer., National Institute on Aging Working Group. *Multidimensional Measurement of Religiousness Spirituality for Use in Health Research*. Kalamazoo, MI: Fetzer Institute; 2003.
20. Underwood LG, Teresi JA. The daily spiritual experience scale: development, theoretical description, reliability, exploratory factor analysis, and preliminary construct validity using health-related data. *Ann Behav Med*. 2002; 24(1):22–33. https://doi.org/10.1207/S15324796ABM2401_04 PMID: 12008791.
21. Bruce MA, Bowie JV, Barge H, Beech BM, LaVeist TA, Howard DL, et al. Religious Coping and Quality of Life Among Black and White Men With Prostate Cancer. *Cancer Control*. 2020; 27(3):1073274820936288. Epub 2020/07/09. <https://doi.org/10.1177/1073274820936288> PMID: 32638611; PubMed Central PMCID: PMC7346696.
22. Chatters LM, Taylor RJ. Age differences in religious participation among Black adults. *Journal of Gerontology*. 1989; 44(5):S183–S9. <https://doi.org/10.1093/geronj/44.5.s183> PMID: 2768778
23. Moberg DO. Religiosity in old age. *The Gerontologist*. 1965; 5(2):78–87. <https://doi.org/10.1093/geront/5.2.78> PMID: 14300185
24. Taylor RJ, Chatters LM, Jackson JS. Religious and Spiritual Involvement Among Older African Americans, Caribbean Blacks, and Non-Hispanic Whites: Findings From the National Survey of American Life. *The Journals of Gerontology: Series B*. 2007; 62(4):S238–S50. <https://doi.org/10.1093/geronb/62.4.S238> PMID: 17673537
25. Bowie JV, Parker LJ, Beadle-Holder M, Ezema A, Bruce MA, Thorpe RJ Jr., The Influence of Religious Attendance on Smoking Among Black Men. *Subst Use Misuse*. 2017; 52(5):581–6. Epub 2016/12/30. <https://doi.org/10.1080/10826084.2016.1245342> PMID: 28033482.
26. Bruce MA, Bowie JV, Beech BM, Norris KC, LaVeist TA, Howard DL, et al. Church Attendance and Mobility Limitation Among Black and White Men With Prostate Cancer. *Am J Mens Health*. 2021; 15(1):1557988321993560. Epub 2021/02/13. <https://doi.org/10.1177/1557988321993560> PMID: 33576283; PubMed Central PMCID: PMC7883168.
27. Bruce MA, Martins D, Duru K, Beech BM, Sims M, Harawa N, et al. Church attendance, allostatic load and mortality in middle aged adults. *PLoS One*. 2017; 12(5):e0177618. <https://doi.org/10.1371/journal.pone.0177618> PMID: 28520779.
28. Gillum RF, King DE, Obisesan TO, Koenig HG. Frequency of attendance at religious services and mortality in a US national cohort. *Annals of epidemiology*. 2008; 18(2):124–9.
29. Koenig HG, Hays JC, Larson DB, George LK, Cohen HJ, McCullough ME, et al. Does religious attendance prolong survival? A six-year follow-up study of 3,968 older adults. *The journals of gerontology Series A, Biological sciences and medical sciences*. 1999; 54(7):M370–6. Epub 1999/08/26. <https://doi.org/10.1093/gerona/54.7.m370> PMID: 10462170.
30. Hummer RA, Rogers RG, Nam CB, Ellison CG. Religious involvement and U.S. adult mortality. *Demography*. 1999; 36(2):273–85. PMID: 10332617.
31. Idler E, Blevins J, Kiser M, Hogue C. Religion, a social determinant of mortality? A 10-year follow-up of the Health and Retirement Study. *PLoS One*. 2017; 12(12):e0189134. Epub 2017/12/21. <https://doi.org/10.1371/journal.pone.0189134> PMID: 29261682; PubMed Central PMCID: PMC5738040.
32. Centers for Disease Control and Prevention. Plan and operation of the Third National Health and Nutrition Examination Survey, 1988–94: series 1: programs and collection procedures. *Vital Health Statistics*. 1994; 1(32):1–407.
33. National Center for Health Statistics, Centers for Disease Control and Prevention. Plan, and Operation of the Third National Health and Nutrition Examination Survey (NHANES III, 1988–94): Reference Manuals and Reports: Weighting and Estimation Methodology Report. Hyattsville, MD: US Dept of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention; 1998.
34. Nagy CL, Bernard MA, Hodes RJ. National Institute on Aging at Middle Age-Its Past, Present, and Future. *Journal of the American Geriatrics Society*. 2012; 60(6):1165–9. <https://doi.org/10.1111/j.1532-5415.2012.03994.x> PMID: 22646926
35. National Center for Health Statistics, Office of Analysis and Epidemiology. Third National Health and Nutrition Examination Survey (NHANES III) Linked Mortality File, Mortality follow-up through 2006: Matching Methodology May 2009. Hyattsville, MD: US Dept of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention; 2009 [cited 2016 May 9]. Available from: http://www.cdc.gov/nchs/data/datalinkage/matching_methodology_nhanes3_final.pdf.
36. Duru OK, Harawa NT, Kermah D, Norris KC. Allostatic load burden and racial disparities in mortality. *Journal of the National Medical Association*. 2012; 104(1–2):89–95. [https://doi.org/10.1016/s0027-9684\(15\)30120-6](https://doi.org/10.1016/s0027-9684(15)30120-6) PMID: 22708252; PubMed Central PMCID: PMC3417124.
37. Geronimus AT, Hicken M, Keene D, Bound J. "Weathering" and age patterns of allostatic load scores among blacks and whites in the United States. *Am J Public Health*. 2006; 96(5):826–33. <https://doi.org/10.2105/AJPH.2004.060749> PMID: 16380565; PubMed Central PMCID: PMC1470581.

38. Abidin RR. Parenting stress index. Psychological Assessment Resources, Inc; 1995.
39. Keeling LA, Spiridigliozzi GA, Hart SJ, Baker JA, Jones HN, Kishnani PS. Challenges in measuring the effects of pharmacological interventions on cognitive and adaptive functioning in individuals with Down syndrome: A systematic review. *Am J Med Genet A*. 2017; 173(11):3058–66. Epub 2017/09/01. <https://doi.org/10.1002/ajmg.a.38416> PMID: 28857390.
40. Ferraro KF, Farmer MM. Utility of health data from social surveys: Is there a gold standard for measuring morbidity? *American Sociological Review*. 1999; 64(2):303–15.
41. U. S. Department of Health and Human Services., National Center for Health Statistics. Analytic and reporting guidelines: The Third National Health and Nutrition Examination Survey, NHANES III (1988–94). Hyattsville, MD: Centers for Disease Control and Prevention; 1996.
42. Arias E, Bastian B, Xu J, Tejada-Vera B. US state life tables, 2018. 2021.
43. Koenig H, King D, Carson VB. Handbook of religion and health. New York: Oxford University Press; 2012.
44. Pargament KI, Smith BW, Koenig HG, Perez L. Patterns of positive and negative religious coping with major life stressors. *Journal for the scientific study of religion*. 1998;710–24.
45. Davison SN, Jhangri GS. Existential and supportive care needs among patients with chronic kidney disease. *J Pain Symptom Manage*. 2010; 40(6):838–43. Epub 2010/08/27. <https://doi.org/10.1016/j.jpainsymman.2010.03.015> PMID: 20739142.
46. Krause N, Hayward RD. Church-based social support, functional disability, and change in personal control over time. *Journal of religion and health*. 2014; 53(1):267–78. <https://doi.org/10.1007/s10943-013-9707-0> PMID: 23553003
47. Taylor RJ, Chatters LM. Church members as a source of informal social support. Review of religious research. 1988:193–203.
48. Lincoln CE, Mamiya LH. The black church in the African American experience: Duke University Press; 1990.
49. Taylor RJ, Chatters LM, Brown RK. African American Religious Participation. *Rev Relig Res*. 2014; 56(4):513–38. Epub 2015/01/13. <https://doi.org/10.1007/s13644-013-0144-z> PMID: 25580034; PubMed Central PMCID: PMC4285628.
50. Taylor RJ, Thornton MC, Chatters LM. Black Americans' perceptions of the sociohistorical role of the church. *Journal of Black Studies*. 1987; 18(2):123–38.
51. Cone J. Black theology and black power: Orbis Books; 2018.
52. Cone JH. A Black theology of liberation: Orbis Books; 2010.
53. Hopkins DN. Introducing black theology of liberation: Orbis Books; 2014.
54. Bellingham R, Cohen B, Jones T, Spaniol L. Connectedness: Some skills for spiritual health. *American Journal of Health Promotion*. 1989; 4(1):18–31. <https://doi.org/10.4278/0890-1171-4.1.18> PMID: 22204354
55. Russell RD. A joust with Obie: Some comments on convictions held by Delbert Oberteuffer about health and health education. *Health Education*. 1984; 15(2):3–7.
56. Bruce MA, Skrine Jeffers K, King Robinson J, Norris KC. Contemplative Practices: A Strategy to Improve Health and Reduce Disparities. *International Journal of Environmental Research and Public Health*. 2018; 15(10):2253. <https://doi.org/10.3390/ijerph15102253> PMID: 30326604
57. Cushing RE, Braun KL. Mind-Body Therapy for Military Veterans with Post-Traumatic Stress Disorder: A Systematic Review. *Journal of alternative and complementary medicine (New York, NY)*. 2017. Epub 2017/09/08. <https://doi.org/10.1089/acm.2017.0176> PMID: 28880607.
58. Levine GN, Lange RA, Bairey-Merz CN, Davidson RJ, Jamerson K, Mehta PK, et al. Meditation and Cardiovascular Risk Reduction: A Scientific Statement From the American Heart Association. *Journal of the American Heart Association*. 2017; 6(10). Epub 2017/10/01. <https://doi.org/10.1161/JAHA.117.002218> PMID: 28963100.
59. Schneider RH, Grim CE, Rainforth MV, Kotchen T, Nidich SI, Gaylord-King C, et al. Stress reduction in the secondary prevention of cardiovascular disease: randomized, controlled trial of transcendental meditation and health education in Blacks. *Circulation Cardiovascular quality and outcomes*. 2012; 5(6):750–8. Epub 2012/11/15. <https://doi.org/10.1161/CIRCOUTCOMES.112.967406> PMID: 23149426.
60. Schneider RH, Castillo-Richmond A, Alexander CN, Myers H, Kaushik V, Aranguri C, et al. Behavioral treatment of hypertensive heart disease in African Americans: rationale and design of a randomized controlled trial. *Behav Med*. 2001; 27(2):83–95. <https://doi.org/10.1080/08964280109595775> PMID: 11763829.
61. Schneider RH, Clarence G, Kotchen T, Marwaha K, Kotchen J, Salerno JW, et al. Randomized controlled trial of stress reduction with meditation and health education in black men and women with high

- normal and normal blood pressure. *American Journal of Preventive Cardiology*. 2021; 8:100279. <https://doi.org/10.1016/j.ajpc.2021.100279> PMID: 34729544
62. Diamond SJ, Thomas CR Jr., Desai S, Holliday EB, Jaggi R, Schmitt C, et al. Gender Differences in Publication Productivity, Academic Rank, and Career Duration Among U.S. Academic Gastroenterology Faculty. *Academic medicine: journal of the Association of American Medical Colleges*. 2016. Epub 2016/05/05. <https://doi.org/10.1097/acm.0000000000001219> PMID: 27144993.
 63. Bruce MA, Norris KC, Thorpe RJ Jr., Religious Service Attendance and Despair Among Health Professionals—A Catalyst for New Avenues of Inquiry. *JAMA Psychiatry*. 2020. <https://doi.org/10.1001/jamapsychiatry.2020.0173> PMID: 32374354