Sex differences in atrial fibrillation: patient-reported outcomes and the persistent toll on women ☆

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ABSTRACT

Background: Women have worse patient-reported outcomes in atrial fibrillation (AF) than men, but the reasons remain poorly understood. We investigated how comorbid conditions, treatment, social factors, and their modification by sex would attenuate sex-specific differences in patient-reported outcomes in AF.

Methods: In a cohort with prevalent AF we measured patient-reported outcomes with the Short-Form-12 (SF-12, an 8-domain quality of life measure), and the AF Effect on QualiTy of Life (AFEQT), an instrument specific to AF, both with range 0-100 and higher scores indicating superior outcomes. We examined sex-specific differences in patient-reported outcomes in multivariable-adjusted regression analyses incorporating demographics, comorbid conditions, treatment, social factors, and their sex-based modification.

Results: In 339 individuals (age 72±10, 45% women), women (vs. men) reported worse physical functioning on the SF-12 (49.7±39.0 versus 65.0±34.0), social functioning (69.8±31.8 versus 79.7±25.8), and mental health (67.4±20.2 versus 75.0±18.6). These differences were attenuated with adjustment for comorbid conditions and depression. Women had worse composite AFEQT scores (73.8±18.4 versus 78.5±16.6) and symptoms and treatment scores than men with differences remaining significant after multivariable adjustment. There were not significant interactions by sex and the array of covariates when examining differences in patient-reported outcomes between women and men.

Conclusions: We identified sex-specific differences in patient-reported outcomes assessed with general and AF-specific measures. Compared to men, women with AF reported worse overall health-related quality of life, even after consideration of both relevant covariates and their modification by sex. Our research indicates the importance of consideration of sex-based inequities when evaluating patient-reported outcomes in AF.

Introduction

Individuals with atrial fibrillation (AF) commonly experience substantial physical, psychological, and psychosocial effects from the symptoms, treatment, and clinical adversity which accompany the arrhythmia. Patient-reported outcomes relevant to AF – which include symptoms, treatment satisfaction, and quality of life – have been prioritized by professional society guidelines and statements as fundamental benchmarks for the management of AF.(1, 2) Increasingly incorporated as clinical trial endpoints, patient-reported outcomes may also guide the evaluation of AF treatment approaches.(3–5)

Attention to patient-reported outcomes has further underscored sex-specific differences in AF. Prior research has consistently found that men and women experience differences in AF epidemiology, presentation, and treatment.(6-9) The distinct experience of women relative to men likewise extends to patient-reported outcomes that encompass impairment and symptom burden related to the condition.(7, 10, 11) Registry data support that women experience a clinically important difference in quality of life than men, even when receiving clinical care and appropriate treatment.(10, 12, 13) Sex-specific differences in AF may also result from differential treatment by providers, as women are less likely than men to receive electrophysiologic therapies or other treatments to

address AF.(6, 14, 15) The observed differences in patient-reported outcomes may also be secondary to heterogenous factors that differ by men and women at the individual level, such as social role and resources (i.e., income and wealth), educational attainment, and psychological comorbidity such as depression.(16) Despite evidence of differences in patient-reported outcomes between women and men with AF, studies have not determined whether those differences are in fact explained by individual- and/or provider-level factors.

In the present study, we investigated contributions of individual- and provider-level factors to sex-specific differences in patient-reported outcomes in AF. We recruited a cohort of individuals receiving treatment for prevalent AF in a regional health care system. We first identified the extent of sex-specific differences in patient-reported outcomes. Second, we examined the modification of comorbid conditions, AF treatment, and social factors by sex, as we sought to determine whether such interactions might explain why women have worse patient-reported outcomes in AF compared to men. Our first hypothesis was that women would report worse patient-reported outcomes than men, consistent with prior literature summarized here. Our second hypothesis was that the demographic, clinical, and social factors associated with patient-reported outcomes would vary for women and men.

Methods

Study participants were recruited from ambulatory clinics at the University of Pittsburgh Medical Center, a large, regional health care system with a longitudinal, uniform electronic health record system. Participants were identified by screening of the electronic health record and direct contact at ambulatory visits, referral by physicians and other providers, and self-referral via the University of Pittsburgh's Center for Assistance in Research eRecord, which serves as a web-based portal for institutional-based clinical research. Eligibility criteria consisted of age ≥18 years; a documented history of prevalent AF, as established by the electronic health record; and receipt of oral anticoagulation for the purpose of ischemic stroke prevention as indicated for AF.(1) For clarity, prevalent AF in this context demarcates individuals who had been diagnosed with the condition prior to study enrollment, and hence meeting the inclusion criteria of having a documented diagnosis of AF. From 2016-2018, the study team approached 486 potentially eligible participants, 339 of whom agreed to participate in the current sample. All participants provided written informed consent and the University of Pittsburgh Institutional Review Board approved the study protocol in keeping with the ethical guidelines of the 1975 Declaration of Helsinki.

Demographics (age, sex, and race) were obtained from participant self-report or the electronic health record. Body mass index was extracted from the most recent recorded measure in proximity to enrollment available in the electronic health record. Comorbid diagnoses, including heart failure and its classification as preserved or reduced; hypertension; diabetes; and cardiovascular disease, identified individually as history of stroke, myocardial infarction, and diagnoses of peripheral arterial disease or atherosclerotic aortic disease, came from the electronic health record. Depression was evaluated using the Patient Health Questionnaire-9 (PHQ-9), a validated instrument for quantification of depression severity with scores ranging from 0 to 27 (higher scores indicate more severe depression),(17) and included because of our prior determination of the association of depression with general and AF-specific measurement of patient-reported outcomes in AF.(18) Treatment for AF including antiarrhythmic medications (flecainide, sotalol, amiodarone, propafenone, dofetilide, or lidocaine), electronic or pharmacologic cardioversion, or prior catheter ablation for AF, were extracted from the longitudinal electronic health record.

We included social measures because of their relevance to AF as well as patient-reported outcomes.(19, 20) Annual household income, obtained by self-report, was categorized as <$19,000; $20,000-$49,999; $50,000-$99,999; >$100,000 per year. Similarly, educational attainment was collected with self-report and categorized (≤high school or

vocational training; some part of college or an associate degree; bachelor's degree; or any graduate or professional school degree). Health Literacy, relevant given the complexity of AF management, and how limited health literacy may exacerbate challenges with the disease, was assessed with the Short-Test Of Functional Health Literacy in Adults (S-TOFHLA).(21, 22)

Patient-reported outcomes were obtained with two complementary widely validated measures. The Short Form Survey (SF-12) assesses general physical and mental health related quality of life across eight domains (physical functioning, role limitation due to physical problems, bodily pain, general health, vitality, social functioning, role limitation due to emotional problems, and mental health), with scores ranging from 0 to 100 (22). Patient-reported outcomes specific to AF were collected with the AF Effect on QualiTy of life instrument (AFEQT), a 20-item instrument scored from 0 to 100, which encompasses a global score and 4 domain scores (symptoms, daily activities, treatment concerns, and treatment satisfaction) to measure status of these domains in the prior 4 weeks.(23) The minimal clinically important difference of the AFEQT measure has been suggested as 5 points.(13) For both measures, higher scores indicate more favorable patient-reported outcomes. The SF-12 was introduced following study initiation to complement the disease-specific AFEQT instrument.

Statistical methods

We summarized continuous variables using means and standard deviations (SD) and categorical variables by their frequency and percentage (n, %). We compared patient characteristics by sex using the chi-squared test for categorical variables and t-test for continuous variables. We summarized the distributions of the patient-reported outcomes measures for the total and 4 subscores that comprise the AFEQT and for each of the 8 domains that comprise the SF-12, in summary and for each subscale by sex. We then examined differences in each outcome by sex in a series of multivariable regression models. Multivariable models had sequential, progressive adjustment that included: demographics, consisting of age and race (model 1); followed by the addition of body mass index, hypertension, diabetes, heart failure, history of stroke or transient ischemic attack, and cardiovascular disease, and history of cardioversion/pulmonary vein isolation, and anti-arrhythmic medication (model 2); followed by the addition of social factors, household income and educational attainment, as well as depression measured by the PHQ-9 modeled as a continuous variable (model 3).

In addition to the three models, we investigated the interaction of the main effects of all variables included in these models between sex and each covariate. The interaction terms were comprised of demographics, as included in model 1; clinical characteristics and comorbid conditions, as included in model 2; and PHQ-9 and the social assessments as included in model 3. The interaction model included main effect terms for all covariates as well as their sex-specific interaction (e.g., sex*covariate). Statistical analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC). We considered an alpha ≤0.05 as indicating statistical significance.

Results

Of the 339 enrolled participants (age 72.0±10.1, 45.1% women, 94% white race), the majority (71.1%) had hypertension and approximately 20% had diabetes, heart failure, and vascular disease. Regarding pulmonary vein isolation or ablation for AF and cardioversion, no statistically significant difference was found between sexes; 32.6% [47] of the 120 patients that received previous ablation or cardioversion were women, vs. 37.4% [73] were men, p=0.36. Compared to men, women were slightly older (71.0 vs. 73.3 years, respectively) and were more likely to have hypertension (66.2% vs. 77.8%, respectively). Women and men had similar annual household income, educational attainment, health literacy, and level of depression as indicated by PHQ-9 (Table 1).

Table 1
Patient Characteristics in individuals with Atrial Fibrillation (AF), by sex.

Characteristic	All Participants n = 339	Women n = 144	Men n = 195	P-Value
Age	72.0 ± 10.1	73.3 ± 9.7	71.0 ± 10.4	0.04
Race				
White	319 (94.1%)	135 (93.8%)	184 (94.4%)	0.59
Black	13 (3.8%)	6 (4.2%)	7 (3.6%)	
Other	5 (1.5%)	2 (1.4%)	3 (1.5%)	
Did Not Answer	2 (0.6%)	1 (0.7%)	1 (0.5%)	
BMI	31.2 ± 7.20	31.7 ± 8.24	30.9 ± 6.31	0.33
CHF	62 (18.3%)	22 (15.3%)	40 (20.5%)	0.23
HTN	241 (71.1%)	112 (77.8%)	129 (66.2%)	0.02
DM	81 (23.9%)	32 (22.2%)	49 (25.1%)	0.51
Stroke/TIA	25 (7.4%)	8 (5.6%)	17 (8.7%)	0.27
Vascular Disease	65 (19.2%)	20 (13.9%)	45 (23.1%)	0.03
History of Cardioversion/PVI	120 (35.4%)	47 (32.6%)	73 (37.4%)	0.36
Anti-Arrhythmic Medication	84 (24.8%)	34 (23.6%)	50 (25.6%)	0.66
Education				
HS or Vocational	117 (34.5%)	51 (35.4%)	66 (33.8%)	0.92
Some College	67 (19.8%)	30 (20.8%)	37 (19.0%)	
Bachelor's	79 (23.3%)	33 (22.9%)	46 (23.6%)	
Graduate	76 (22.4%)	30 (20.8%)	46 (23.6%)	
Income				
<$19,999	35 (10.3%)	19 (13.2%)	16 (8.2%)	0.09
$20,000-49,999	99 (29.2%)	44 (30.6%)	55 (28.2%)	
$50,000-99,999	97 (28.6%)	31 (21.5%)	66 (33.8%)	
>$100,000	64 (18.9%)	24 (16.7%)	40 (20.5%)	
Did Not Answer	44 (13.0%)	26 (18.1%)	18 (9.2%)	
PHQ-9 Score	3.31 ± 3.35	3.56 ± 3.40	3.11 ± 3.31	0.28
PHQ-9 Categories				0.7
0-4 (Minimal)	271 (79.9%)	111 (77.1%)	160 (82.1%)	
5-9 (Mild)	51 (15.0%)	25 (17.4%)	26 (13.3%)	
10-14 (Moderate)	12 (3.5%)	6 (4.2%)	6 (3.1%)	
15-19 (Moderately Severe)	5 (1.5%)	2 (1.4%)	3 (1.5%)	

Categorical variables summarized as n (%); significance test performed using chi-squared test. Continuous variables summarized as mean ± SD; significance test performed using t-test. BMI indicates body mass index; CHF indicates congestive heart failure; HTN indicated hypertension, DM indicates diabetes mellitus, TIA indicates transient ischemic attack; HS indicates high school.

Table 2
Patient-reported outcome measures individuals with atrial fibrillation, stratified by sex.

Characteristic	All Participants n = 339	Women n = 144	Men n = 195	Model 1 P-value	Model 2 P-value	Model 3 P-value
AFEQT						
Symptom Score	85.6 ± 17.1	82.5 ± 18.3	87.9 ± 15.8	<0.001	<0.001	0.011
Daily Activity Score	69.4 ± 24.7	66.2 ± 25.5	71.8 ± 23.9	0.028	0.012	0.34
Treatment Score	78.9 ± 20.0	76.6 ± 20.4	80.7 ± 19.6	0.014	0.014	0.010
Satisfaction Score	79.7 ± 22.3	78.8 ± 23.8	80.3 ± 21.2	0.49	0.35	0.94
Total Score	76.5 ± 17.5	73.8 ± 18.4	78.5 ± 16.6	0.004	0.002	0.048
SF-12						
Physical Functioning	59.3 ± 36.6	49.7 ± 39.0	65.0 ± 34.0	0.004	0.005	0.09
Role Limitation Physical	56.9 ± 26.9	56.0 ± 27.6	57.4 ± 26.5	0.81	0.61	0.66
Pain	69.0 ± 32.7	66.9 ± 33.1	70.3 ± 32.6	0.40	0.51	0.34
General Health	53.9 ± 27.5	52.8 ± 26.4	54.6 ± 28.3	0.55	0.94	0.35
Vitality	46.2 ± 24.6	45.1 ± 25.3	46.9 ± 24.3	0.65	0.76	0.80
Social Functioning	76.0 ± 28.5	69.8 ± 31.8	79.7 ± 25.8	0.009	0.030	0.24
Role Limitation Emotional1	76.3 ± 24.0	72.2 ± 25.1	78.8 ± 23.1	0.06	0.11	0.63
Mental Health	72.1 ± 19.5	67.4 ± 20.2	75.0 ± 18.6	0.003	0.01	0.08
Physical Health Composite	40.7 ± 11.3	39.7 ± 11.5	41.3 ± 11.3	0.32	0.34	0.66
Mental Health Composite	50.2 ± 9.82	48.4 ± 10.3	51.3 ± 9.39	0.027	0.07	0.50

Model 1, adjusted for age and race. Model 2, adjusted for all variables in Model 1 plus body mass index, hypertension, diabetes, history of stroke or transient ischemic attack, cardiovascular disease, history of cardioversion/PVI, and treatment with anti-arrhythmic medication. Model 3, adjusted for all variables in Model 2 plus PHQ-9, household income, and educational attainment.

The differences in patient-reported outcomes by sex are summarized in Table 2. All participants (n=339) completed the AFEQT. In contrast, 205 participants completed the SF-12. There were no differences in SF-12 completion by sex. Women reported lower quality of life than men on each of the 8 subscales of the SF-12. There were significant differences in physical functioning (p=0.005), social functioning (p=0.03), mental health (p=0.010) which remained significant following adjustment for demographics, clinical covariates, AF treatment. These sex-based differences were no longer significant with inclusion of household income, educational attainment, and PHQ-9 scores in multivariable adjustment. Fig. 1 summarizes the differences across SF-12 score measures by sex.
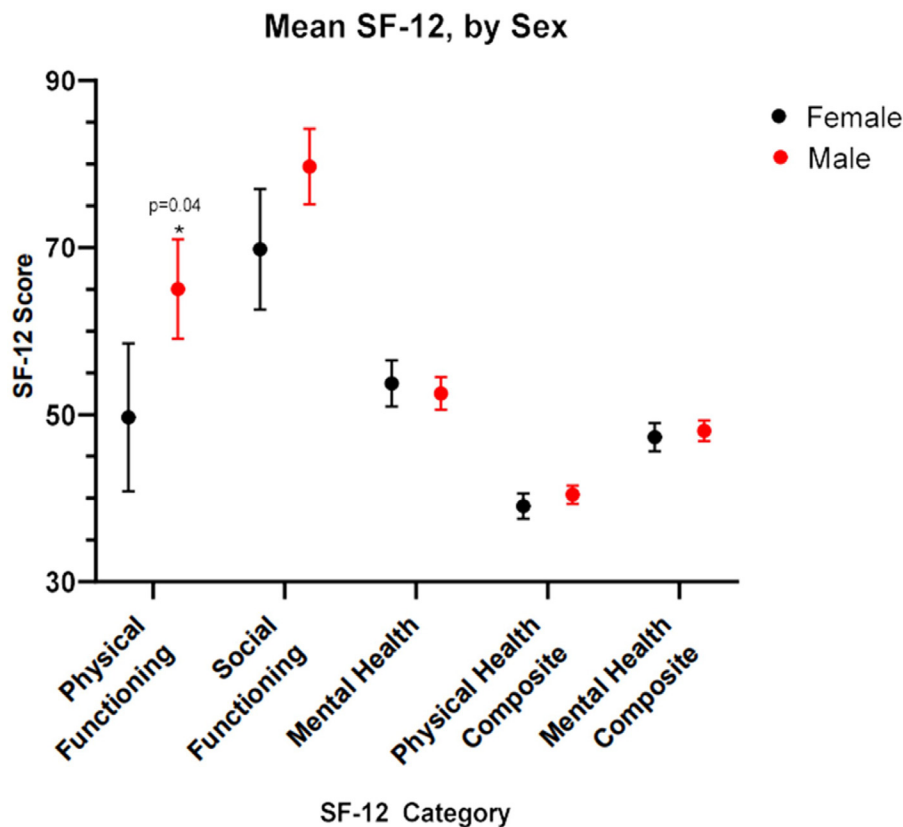
Fig. 1. The distributions of the Short Form-12 (SF-12) by sex, indicating inferior ratings of physical functioning in women compared to men.

Regarding AF-specific patient-reported outcomes, women reported worse AFEQT scores than men for all 4 domains and for the total score (Table 2). The difference in the total score between women and men approached 5 points, previously suggested as the minimum clinically important difference in this measure,(3) and it remained statistically significant even after adjustment for clinical and social covariates as well as AF treatments and PHQ scores. Within the AFEQT domain scores, differences between men and women remained significant after multivariable adjustment for the symptom (p=0.011) and treatment (p=0.010) subscales but not for daily activity (p=0.35) or satisfaction (p=0.94) subscales. Fig. 2 summarizes the differences in total and domain AFEQT scores by sex.

The results of sex-based interactions are provided in Table 3, which presents the results of interaction terms between sex and each of the covariates in the fully adjusted model. Only 1 subscale for a single measure of patient-reported outcomes was significant, which was the interaction between sex and income in relation to the AFEQT symptom domain; sex and income did not have a significant interaction with the total AFEQT score or the other domains. The results overall suggest that the differences measured between women and men in patient-reported outcomes are not modified by sex-based interactions affecting clinical covariates, AF treatment, depression, or social factors such as household income and educational attainment.

Discussion

In this moderate-sized cohort of individuals receiving clinical care for prevalent AF, we observed differences in patient-reported outcome between women and men. Specifically, women had worse AF-specific patient-reported indicators of quality of life and symptom management, even following adjustment for demographics, clinical covariates, and social factors. Consistent with our first hypothesis as well as the prior literature, we identified differences in patient-reported outcomes by sex in women and men with AF. We expected that accounting for such fac-

tors would diminish or attenuate differences in patient-reported outcomes by sex. Yet, contrary to our second hypothesis, we did not find that the association between clinical covariates, AF treatment, household income, educational attainment, or the PHQ-9 and patient-reported outcomes differed for men and women. Given the lack of interaction between sex and each of these covariates, and the persistent sex-specific differences in patient-reported outcomes even after accounting for these covariates, additional research is needed to identify intervenable mechanisms that account for the different AF-related experiences between men and women.

Differences in patient-reported experiences with AF have been identified and well summarized.(11) A systematic review and meta-analysis of studies examining sex differences in individuals with AF identified consistent findings of women having worse health-related quality of life compared to men.(24) Our study adds to this literature by consideration of additional factors encompassing treatment, household income and educational attainment, and psychological factors. Our study further adds to this literature by examining whether differences in patient-reported outcomes between women and men are due to differences by sex in comorbidity, treatment, depression, or social factors. Consequently, we assessed for interactions with the array of diverse variables included in our analysis, expecting that modification by sex would have a substantive contribution substantively towards differences in patient-reported outcomes between women and men. Our results suggest otherwise and support the important observation that women with AF experience worse patient-reported outcomes as captured by general and AF-specific measures.

Our findings may have multiple potential explanations. First, women may experience social and structural barriers to care, neither of which was accounted for or measured by analysis. Women may also have more limited non-financial social resources, such as social support, compared to men, also not quantified here. Second, there may also be differences in AF treatment by sex that were not accounted for in our analysis. For example, previous work has shown that women are significantly
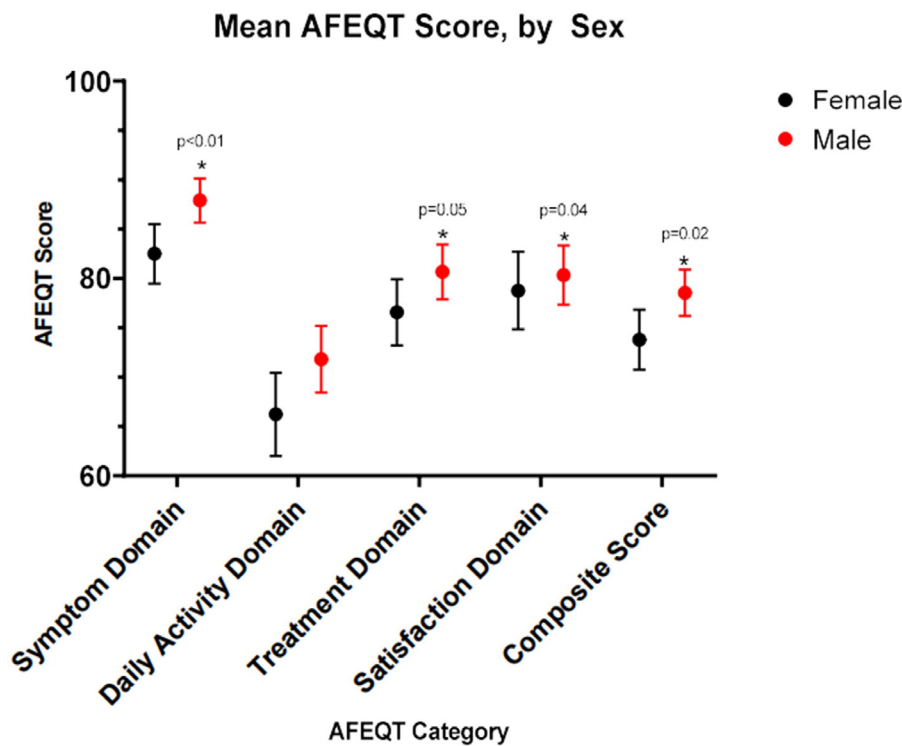
Fig. 2. The distributions in the Atrial Fibrillation Effect on Quality of Life (AFEQT) scores, indicating the inferior scores of women in the symptom domain, treatment domain, and overall composite score compared to men.

Table 3
Assessment of interaction with inclusion of interaction term for sex in the multivariable model to examine differences in Patient Reported Outcomes between women and men with atrial fibrillation.

	Age	BMI	Heart failure	Hyper-tension	Diabetes	Stroke or TIA	VascularDisease	DCCV or PVI	Anti-arrhythmic	Income	Education	PHQ-9
AFEQT												
Symptom	1.00	0.21	0.84	0.55	0.67	0.41	0.23	0.27	0.07	0.79	0.002	0.04
Daily Activity	0.0002	0.012	0.33	0.14	0.66	0.37	0.73	0.11	0.20	0.81	0.36	0.84
Treatment	0.16	0.61	0.86	0.88	0.78	0.19	0.26	0.62	0.17	0.27	0.79	0.42
Satisfaction	0.75	0.07	0.70	0.39	0.55	0.33	0.75	0.27	0.008	0.79	0.31	0.06
Total Score	0.008	0.02	0.66	0.38	0.98	0.19	0.59	0.67	0.67	0.67	0.80	0.64
SF-12												
Physical Functioning	0.02	0.01	0.76	0.61	0.45	0.73	0.18	0.90	0.24	0.42	0.44	0.12
Role Limitation Physical	0.32	0.11	0.52	0.90	0.34	0.66	0.74	0.90	0.33	0.90	0.53	0.40
Pain	0.13	0.33	0.28	0.51	0.85	0.23	0.33	0.35	0.75	0.91	0.86	0.95
General Health	0.30	0.06	0.25	0.88	0.52	0.84	0.02	0.98	0.90	0.42	0.04	0.78
Vitality	0.24	0.28	0.78	0.30	0.89	0.89	0.17	0.16	0.34	0.41	0.67	0.50
Social Functioning	0.36	0.68	0.76	0.69	0.367	0.60	0.68	0.30	0.38	0.59	0.83	1.00
Role Limitation Emotional	0.26	0.36	0.39	0.35	0.07	0.62	0.66	0.49	0.63	0.59	0.27	0.11
Mental Health	0.90	0.95	0.51	0.05	0.07	0.76	0.68	0.84	0.49	0.89	0.62	0.89
Physical Health Composite	0.04	0.009	0.43	0.67	0.19	0.47	0.06	0.65	0.61	0.97	0.37	0.52
Mental Health Composite	0.94	0.20	0.88	0.09	0.01	0.78	0.36	0.73	0.53	0.98	0.68	0.95

Table legend. Values are P-values for the statistical assessment of sex with the interaction term when added to the full multivariable model (adjustment for all covariates shown). BMI indicates Body Mass Index; TIA, Transient Ischemic Attack; DCCV, cardioversion; PVI, Pulmonary Vein Isolation; PHQ-9, 9-item Patient Health Questionnaire; AFEQT, Atrial Fibrillation Effect on QualiTy of life; SF-12, 12-item Short Form Quality of life.

less likely than men to receive therapeutic anticoagulation, attempts at rhythm control, or undergo invasive cardiovascular procedures.(14, 15) In our study, we did not find differences in use of cardioversion, pulmonary vein isolation, or antiarrhythmic therapy between women and men. However, more subtle differences in treatment by sex may be present. Such differences could possibly include the timing of interventions (not just whether there are differences in treatment by sex, but how soon after developing symptoms do women or men receive such therapy) or intensification of therapy (e.g., such as rapidity of dose escalation to achieve adequate heart rate control, for example); such factors were not measured and accounted for by our analysis. We note specifically that studies of sex differences in patient-reported outcomes have not considered the timing and intensity of therapies, and we suspect that it is possible that delays or postponement of treatment, stemming from

either the patient or physician, may contribute to the inferior outcomes in women identified here. Further understanding of how both symptom burden and treatment in women with AF affects patient-reported outcomes can help target interventions to improve patient-centered outcomes and reduce sex-specific differences.

Our results contribute to the general and increasing evidence that women have a different experience of cardiovascular disease symptoms in AF.(25) Women with acute coronary syndrome (ACS) may have higher burden of cardiovascular risk factors, longer time from symptom onset to hospital presentation, and are less likely to receive percutaneous intervention.(26) Our findings similarly underscore that traditional clinical and social risk factors do not explain differences in the patient experience of AF. Further, the results highlight the importance of continued evaluation of sex-specific differences in AF in clinical trials and observa-

tional studies of AF. An evident implication of our findings is that clinical trials using patient-reported outcomes conduct sex-stratified analyses to assess and elucidate the effectiveness of interventions in women with AF.

The strengths of our study include our recruitment of a moderate-sized cohort with prevalent AF, the use of two well-validated complementary measures to quantify patient-reported outcomes, and the multivariable analysis including demographics, comorbidities, and social factors. Our study also has important limitations. Our study has limited generalizability given that the cohort was recruited from a single health care system. The absence of racial diversity is a crucial deficit to our study. We note that multiple studies have reported racial differences in patient-reported outcomes in individuals with AF.(27, 28) We consider that determining the dual effects of race and sex on patient-reported outcomes in AF merits investigation. Second, we are not able to exclude residual confounding by unmeasured variables that may impact the association of sex and patient-reported outcomes (e.g., alcohol consumption, smoking history, physical activity). Third, our study uses self-report for several covariates including income, education level, and depressive symptoms which may be limited by recall and social desirability bias. Furthermore, clinical attention was not captured, and that along with provider bias may contribute to sex-based differences. Lastly, we assessed the variables at a single time point and it is likely that patient-reported outcomes such as quality of life may evolve with the course of a chronic disease.

Conclusion

In conclusion, we found an that women with AF, report worse quality of life than their male counterparts as measured by general and AF-specific measures of patient-reported outcomes in AF. These results persisted after accounting for clinical and social factors, AF treatment, and depression. We also identified that sex-specific interactions with this array of covariates did not explain or account for the differences between women and men. We consider recognition of sex differences in patient-centered outcomes as highly relevant for the study and treatment of AF. Exploration of the mechanisms for why women with AF report a worse experience than men merits continued investigation.

Authorship contribution

Raisa Silva: Writing, reviewing and editing. Emily Guhl: Writing, reviewing and editing. Andrew D. Althouse: Software, formal analysis, investigation, resources, data curation. Michael Sharbaugh: Formal analysis. Utibe Essien: Writing, reviewing and editing. Leslie Hausman: Writing, reviewing and editing. Jared W Magnani: Conceptualization, methodology, investigation, resources, writing – original draft, funding acquisition.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Conflict of interest

None.

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None.

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