

SUPPLEMENTAL MATERIAL

Table S1. Rationale, contents, and references for the eight psychosocial constructs used in this study.

Name of Psychosocial construct	contents	Measurement	References
Optimism	Optimism was represented by a cluster of constructs, including perceived control, positive expectations, empowerment, fighting spirit, and lack of helplessness.	Optimism was measured using a Life Orientation Test-Revised, a six-item scale that appeared as Items 20-25 on Women's Health Initiative (WHI) questionnaire Form 37.	50
Social Support	Participants were asked to indicate how often each of the nine different types of social support was available to them.	Responses to the nine questions on Form 37 (Items 1-9) were scored on a five-point scale ranging from “none of the time” to “all of the time.”	51
Social Strain	Social strain is often called “negative social support.”	Social strain was measured by Items 16-19 on Form 37. Responses to each item could range from 1 (none) to 5 (all). Responses were summed to yield a social strain score ranging from 4-20, with higher scores indicating greater social strain.	45, 46, 52
Stressful life events	Stressful life events were assessed by asking study participants 11 major life events occurring over the previous year: <ul style="list-style-type: none"> a. did your spouse or partner die? b. Did a close friend or family 	Stressful life events were measured by Items 91, 93-102 on Form 37. The total score ranges from 0 to 33, with higher scores representing greater number and severity of upsetting events.	45, 46, 52

	<p>member die or have a serious illness (other than your spouse or partner?)</p> <ul style="list-style-type: none">c. Did you have major problems with money?d. Did you have a divorce or break up with a spouse or partner?e. Did a family member or close friend have a divorce or break-up?f. Did you have a major conflict with children or grandchildren?g. Did you have any major accidents, disasters, muggings, unwanted sexual experiences, robberies, or similar events?h. Did you or a family member or close friend		
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	<p>lose their job or retire?</p> <p>i. Were you physically abused by being hit, slapped, pushed, shoved, punched or threatened with a weapon by a family member or close friend?</p> <p>j. Were you verbally abused by being made fun of, severely criticized, told you were a stupid or worthless person, or threatened with harm to yourself, your possessions, or your pets, by a family member or close friend?</p> <p>k. Did a pet die?</p>		
Cynical hostility	The relationship between hostility and cardiovascular disease has been demonstrated	Hostility was measured using the 13-item cynicism subscale of the Cook-Medley	53, 54

	in a variety of studies.	Questionnaire as Items 33-45 on Form 37. Higher scores on the scale indicate greater levels of hostility.	
Emotional expressiveness	Emotional expressiveness included 2 measures: negative emotional expressiveness (NEE) and Ambivalence over Emotional expressiveness (AEE).	Emotional expressiveness was assessed by the Ambivalence Over Emotional Expression Questionnaire and Emotional Expressiveness Questionnaire, and included as Items 26-32 on Form 37 (NEE: item 26-29; AEE: item 30-32).	55, 56
Insomnia	Insomnia was assessed by the 5-item Women's Health Initiative Insomnia Rating Scale (WHIIR), which has been previously validated.	The five questions were (Items 114-119 of Form 37): did you have trouble falling asleep? Did you wake up several times at night? Did you wake up earlier than you planned? Did you have trouble getting back to sleep after you woke up too early? Overall, was your typical night's sleep during the past 4 weeks: 1="very restless" to 5="very sound or restful." Score scale: 0 - 20; a higher score indicated greater Insomnia	57, 58
Depressive symptoms	Depressive symptoms were assessed by a brief screening test for depression and mood disorders that has been validated to be a valid and reliable measure of depressed	There were nine items taken from the medical outcome study, Short Form 36, as Items 103-110.1 on Form 37.	59, 60

	mood.		
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Table S2. Pearson statistics (R) and their corresponding *p*-values of correlation between standardized psychosocial constructs with and within their respective clusters.

Stress Cluster	<i>Stress Cluster</i>	Stressful Life events	Depressive symptoms		
Stressful life events	0.69 <i>p</i> <0.001				
Depressive symptoms	0.82 <i>p</i> <0.001	0.36 <i>p</i> <0.001			
Insomnia	0.73 <i>p</i> <0.001	0.18 <i>p</i> <0.001	0.47 <i>p</i> <0.001		
Strain Cluster	<i>Strain Cluster</i>	Optimism*	Social support*	Social strain	Cynical hostility
Optimism ¹	0.68 <i>p</i> <0.001				
Social support ¹	0.61 <i>p</i> <0.001	0.32 <i>p</i> <0.001			
Social strain	0.65 <i>p</i> <0.001	0.25 <i>p</i> <0.001	0.28 <i>p</i> <0.001		
Cynical hostility	0.66 <i>p</i> <0.001	0.30 <i>p</i> <0.001	0.24 <i>p</i> <0.001	0.30 <i>p</i> <0.001	
Emotional expressiveness	0.58 <i>p</i> <0.001	0.28 <i>p</i> <0.001	0.09 <i>p</i> <0.001	0.21 <i>p</i> <0.001	0.24 <i>p</i> <0.001

*Standardized psychosocial stressor values are inverted

Table S3. Univariate and Multivariate-adjusted hazard ratios of cluster quartiles on incident atrial fibrillation.

Model	Stress Cluster		Strain Cluster	
	HR (95% CI)	<i>p</i> -value*	HR (95% CI)	<i>p</i> -value*
Unadjusted		<0.001		<0.001
Quartile 1	1.00 (ref)		1.00 (ref)	
Quartile 2	1.08 (1.04, 1.12)		1.00 (0.96, 1.04)	
Quartile 3	1.12 (1.08, 1.16)		1.04 (1.01, 1.08)	
Quartile 4	1.17 (1.13, 1.22)		1.06 (1.02, 1.10)	
Model 1		<0.001		<0.001
Quartile 1	1.00 (ref)		1.00 (ref)	
Quartile 2	1.06 (1.02, 1.10)		1.00 (0.96, 1.04)	
Quartile 3	1.09 (1.05, 1.13)		1.04 (1.01, 1.08)	
Quartile 4	1.19 (1.14, 1.23)		1.08 (1.04, 1.13)	
Model 2		<0.001		0.003
Quartile 1	1.00 (ref)		1.00 (ref)	
Quartile 2	1.05 (1.01, 1.09)		0.99 (0.96, 1.03)	
Quartile 3	1.09 (1.05, 1.13)		1.03 (0.99, 1.07)	
Quartile 4	1.17 (1.12, 1.21)		1.05 (1.01, 1.09)	
Model 3		<0.001		0.03
Quartile 1	1.00 (ref)		1.00 (ref)	
Quartile 2	1.04 (1.00, 1.08)		0.99 (0.95, 1.03)	
Quartile 3	1.07 (1.03, 1.11)		1.02 (0.99, 1.06)	
Quartile 4	1.14 (1.10, 1.19)		1.03 (1.00, 1.08)	

Hazard ratios (HRs) and confidence intervals (CIs) are from a proportional hazards model with incident atrial fibrillation (AF) as a function of Stress Cluster and Strain Cluster quartiles.

Stress Cluster: Stressful life events, depressive symptoms, insomnia

Strain Cluster: Optimism, social support, social strain, cynical hostility, emotional expressiveness

All models are stratified by Women's Health Initiative component (clinical trial/observational study)

Model 1: Adjusted for age, ethnicity, race, and education

Model 2: Model 1 + waist-hip ratio, physical activity, smoking, alcohol

Model 3: Model 2 + hypertension, diabetes, heart failure, myocardial infarction

**p*-value tests from a separate proportional hazards model with incident AF as a function of linear trend over cluster quartiles.

Table S4. Hazard ratios of the two psychosocial clusters on incident atrial fibrillation, as stratified by baseline subgroups.

Subgroup	Incident atrial fibrillation			Stress Cluster		Strain Cluster	
	n	Events	Annual %	HR (95% CI)*	<i>p</i> -value [†]	HR (95% CI)*	<i>p</i> -value [†]
Overall	83736	23954	2.72	1.07 (1.05, 1.09)		1.03 (1.00, 1.05)	
Age					0.008 [†]		0.10 [†]
50-59	24350	3555	1.82	1.07 (1.02, 1.12)		1.11 (1.05, 1.17)	
60-69	39930	12093	2.57	1.10 (1.07, 1.13)		1.00 (0.94, 1.04)	
70-79	19456	8306	3.88	1.01 (0.97, 1.04)		1.02 (0.98, 1.06)	
Race/Ethnicity [§]					<0.001		0.06
Non-Hispanic White	72214	21608	2.82	1.07 (1.05, 1.09)		1.02 (0.99, 1.04)	
Non-Hispanic Black	5934	1197	2.11	1.04 (0.97, 1.12)		1.13 (1.03, 1.23)	
Hispanic	2411	458	2.04	0.98 (0.87, 1.11)		1.16 (1.00, 1.35)	
Non-Hispanic Asian	1524	260	1.46	1.26 (1.04, 1.54)		0.94 (0.75, 1.18)	
Hypertension					0.88		0.46
No	59050	15062	2.40	1.07 (1.04, 1.09)		1.03 (1.00, 1.07)	

Yes	24686	8892	3.52	1.07 (1.04, 1.10)	1.02 (0.98, 1.05)
Treated Diabetes				0.19	0.13
No	80416	22704	2.67	1.07 (1.05, 1.09)	1.02 (1.00, 1.05)
Yes	3320	1250	4.25	1.02 (0.94, 1.10)	1.10 (1.00, 1.21)
Coronary artery disease ¹				0.10	0.29
No	81487	22908	2.66	1.07 (1.05, 1.09)	1.02 (1.00, 1.05)
Yes	2249	1046	5.33	0.99 (0.91, 1.08)	1.09 (0.98, 1.21)
Smoking				0.14	0.01
Never	42736	11988	2.60	1.07 (1.05, 1.10)	1.00 (0.97, 1.04)
Past	35476	10472	2.83	1.05 (1.02, 1.08)	1.07 (1.03, 1.11)
Current	5524	1494	3.04	1.13 (1.06, 1.21)	0.96 (0.88, 1.05)
Alcohol, drinks/wk				0.86	0.07
0	34272	10034	2.85	1.07 (1.04, 1.11)	1.06 (1.02, 1.09)
>0 - <7	39229	10728	2.57	1.06 (1.03, 1.10)	1.00 (0.97, 1.04)

≥7	10235	3192	2.90	1.06 (1.01, 1.12)	1.01 (0.95, 1.08)
CHARGE-AF 5 year risk [#]				0.86	0.02
<5%	74127	19245	2.45	1.06 (1.04, 1.09)	1.05 (1.02, 1.07)
≥5%	9609	4709	5.03	1.07 (1.02, 1.13)	0.97 (0.92, 1.03)

Subgroup hazard ratios (HRs), 95% confidence intervals (CIs), and interaction *p*-values are from a proportional hazards regression with atrial fibrillation (AF) as a function of the Stress Cluster, Stress Cluster by subgroup interaction, the Strain Cluster, and Strain Cluster by subgroup interaction, stratified by Women's Health Initiative (WHI) component (clinical trial/observational study), and adjusted for age, ethnicity, race, education, waist-hip ratio, physical activity, smoking, alcohol, hypertension, diabetes, heart failure, and myocardial infarction

*HRs and corresponding CIs are for an increase of 1 point in the given cluster score

†*p*-value is for the subgroup by cluster interaction

‡Cluster by age interaction terms from a separate model with linear trend over age groups, the Stress Cluster, Stress Cluster by linear trend over age groups interaction, the Strain Cluster, and Strain Cluster by linear trend over age groups interaction

§White = Non-Hispanic White; Black = Non-Hispanic Black; Hispanic = Hispanic, all races; Asian = Non-Hispanic Asian

‡History of coronary artery disease (CAD) subgroup model is not adjusted for history of myocardial infarction

#CHARGE-AF (a validated score²⁴⁻²⁷ encompassing traditional AF risk factors to predict incident AF within 5 years in diverse patient populations) subgroup model is stratified by WHI component (clinical trial/observational study) and adjusted for ethnicity, race, education, waist-hip ratio, physical activity, and alcohol