Table S1. Pearson correlation coefficients for sleep variables. MESA study

	Average sleep duration (h)	Average sleep efficiency (%)	Insomnia symptoms (score)	Nap time (h)	AHI
Average sleep duration (h)	–	0.32**** (n = 527)	-0.03 (n = 518)	-0.35**** (n = 527)	-0.12*** (n = 476)
Average sleep efficiency (%)		–	-0.07 (n = 518)	0.04 (n = 527)	-0.17**** (n = 476)
Insomnia symptoms (score)			–	0.07 (n = 518)	-0.07 (n = 470)
Nap time (h)				–	0.08 (n = 476)
AHI					–

Average sleep duration (h): Mean = 6.4 ; Min = 3.1; Max = 8.9

Average sleep efficiency (%): Mean = 89.4; Min = 71.6 ; Max = 97.0

Insomnia symptoms (score): Mean = 8; Min = 0; Max = 20

Average sleep time in naps (h): Mean = 0.7; Min = 0.0; Max = 5.5

AHI = all apneas and hypopnea per hour of sleep: Mean = 23.0; Min = 0; Max = 94.3

***p < 0.01, ****p < 0.0001

Table S2. Mean differences in log transformed **heart rate (HR)** and log transformed **HF-HRV** at baseline and mean differences in responses to mental stress challenge by sleep duration at **7 hours cut point** (n = 3,450 observations, 527 persons)

	Sleep Duration (< 7 h vs. ≥ 7 h (reference))				
	HR (log (beats/min))		HF-HRV (log(msec^2))		
	Mean Differences	95% CI	Mean Differences	95% CI	
Baseline					
Model 1	0.0269	(−0.0024 0.0561)	−0.33	(−0.60, −0.07)**	
Model 2	0.0252	(−0.0047 0.0551)	−0.28	(−0.54, −0.03)**	
Model 3	0.0280	(−0.0036 0.0596)	−0.30	(−0.57, −0.03)**	
Model 4	0.0287	(−0.0033 0.0606)	−0.31	(−0.58, −0.04)**	
Reactivity to Mental Stress[1]					
Model 1	0.0094	(−0.0002 0.0191)*	−0.09	(−0.24, 0.06)	
Model 2	0.0107	(0.0012 0.0202)**	−0.09	(−0.25, 0.06)	
Model 3	0.0105	(0.0003 0.0206)**	−0.10	(−0.26, 0.07)	
Model 4	0.0099	(−0.0002 0.0201)*	−0.11	(−0.28, 0.05)	
Recovery from Mental Stress[2]					
Model 1	−0.0025	(−0.0109 0.0058)	0.14	(0.01, 0.26)**	
Model 2	−0.0034	(−0.0115 0.0047)	0.15	(0.02, 0.27)**	
Model 3	−0.0022	(−0.0107 0.0063)	0.14	(0.02, 0.27)**	
Model 4	−0.0016	(−0.0101 0.0070)	0.15	(0.02, 0.28)**	
Reactivity to Orthostatic Stress[3]					
Model 1	0.0033	(−0.0087 0.0154)	0.05	(−0.15, 0.25)	
Model 2	0.0038	(−0.0088 0.0165)	0.06	(−0.15, 0.26)	
Model 3	0.0054	(−0.0079 0.0186)	0.04	(−0.16, 0.25)	
Model 4	0.0052	(−0.0082 0.0186)	0.02	(−0.18, 0.23)	

[1] Reactivity to mental stress by sleep duration = HR/HF-HRV at mental stress − HR/HF-HRV at baseline
[2] Recovery from mental stress by sleep duration = HR/HF-HRV at recovery − HR/HF-HRV at mental stress
[3] Reactivity to orthostatic stress by sleep duration = HR/HF-HRV at orthostatic stress − HR/HF-HRV at baseline

Note:
A more positive coefficient for the reactivity associated with shorter sleep means a greater HR increase in response to the stressor (greater reactivity); a more negative coefficient for recovery associated with shorter sleep means a greater HR recovery from the stressor
A more negative coefficient for the reactivity associated with shorter sleep means a greater HF-HRV reduction in response to the stressor, a more positive coefficient for recovery associated with shorter sleep means a greater increase in HF-HRV during recovery

Model 1 = age, gender, race/ethnicity, income-wealth index. Model 2 = model 1 plus body mass index, smoking, alcohol consumption, medications (antihypertensive, antidepressants, sympatho-mimetic medications and medication for sleep and mood), diabetes and sleep efficiency. Model 3 = model 2 plus sleep apnea. Model 4 = model 3 plus naps (h/day)

*p < 0.1, **p < 0.05

Table S3. Mean differences in log transformed **heart rate (HR)** at baseline and mean differences in responses to mental stress challenge by sleep duration at <6 h and 6-6.9 h vs. ≥ 7-8.9 h (n= 3,232 observations and 493 participants†).

	< 6 h vs. ≥ 7-8.9 h (ref) HR (log (beats/min))		6 – 6.9 h vs. ≥ 7-8.9 h (ref) HR (log (beats/min))	
	Mean Differences	95% CI	Mean Differences	95% CI
Baseline				
Model 1	0.043	(0.007, 0.080)**	0.023	(−0.012, 0.057)
Model 2	0.042	(0.004, 0.080)**	0.018	(−0.018, 0.053)
Model 3	0.050	(0.010, 0.089)**	0.017	(−0.020, 0.054)
Model 4	0.054	(0.013, 0.096)**	0.017	(−0.020, 0.054)
Reactivity to Mental Stress[1]				
Model 1	0.011	(−0.001, 0.022)*	0.008	(−0.004, 0.019)
Model 2	0.013	(0.001, 0.025)**	0.010	(−0.002, 0.021)
Model 3	0.010	(−0.002, 0.023)	0.010	(−0.002, 0.021)
Model 4	0.009	(−0.004, 0.023)	0.009	(−0.002, 0.021)
Recovery from Mental Stress[2]				
Model 1	-0.001	(−0.012, 0.011)	-0.003	(−0.014, 0.008)
Model 2	-0.003	(−0.015, 0.009)	-0.005	(−0.016, 0.007)
Model 3	-0.001	(−0.013, 0.012)	-0.004	(−0.015, 0.008)
Model 4	0.002	(−0.012, 0.015)	-0.004	(−0.015, 0.008)
Reactivity to Orthostatic Stress[3]				
Model 1	0.008	(−0.001, 0.018)*	0.004	(−0.005, 0.013)
Model 2	0.010	(0.001, 0.020)**	0.005	(−0.004, 0.015)
Model 3	0.013	(0.003, 0.024)**	0.006	(−0.004, 0.015)
Model 4	0.015	(0.004, 0.025)***	0.006	(−0.004, 0.015)

†Sample does not include 34 participants who had **CVD event** (definitive angina pectoris, definitive myocardial infarction, percutaneous transluminal coronary angioplasty, coronary bypass graft or stroke)

[1] Reactivity to mental stress by sleep duration = HR at mental stress − HR at baseline
[2] Recovery from mental stress by sleep duration = HR at recovery − HR at mental stress
[3] Reactivity to orthostatic stress by sleep duration = HR at orthostatic stress − HR at baseline

Note: A more positive coefficient for the reactivity associated with shorter sleep duration means a greater increase in HR response to the stressor (greater reactivity); a more negative coefficient for recovery associated with shorter sleep duration means a greater HR recovery from the stressor

Model 1 = age, gender, race/ethnicity, income-wealth index.
Model 2 = model 1 plus body mass index, smoking, alcohol consumption, medications (antihypertensive, antidepressants, sympatho-mimetic medications and medication for sleep and mood), diabetes and sleep efficiency.
Model 3 = model 2 plus sleep apnea.
Model 4 = model 3 plus naps (h/day)

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table S4. Mean differences in log-transformed **HF-HRV** (log (msec^2)) at baseline and mean differences in responses to mental stress challenge by sleep efficiency (low vs.higher) (n = 3,232 observations 493 persons†) .

	HF-HRV		
	Mean differences	(95% CI)	
Baseline			
Model 1	−0.641	(−1.116	−0.166)***
Model 2	−0.624	(−1.072	−0.176)***
Model 3	−0.630	(−1.099	−0.161)***
Model 4	−0.620	(−1.091	−0.148)**
Reactivity to Mental Stress[1]			
Model 1	0.046	(−0.177	0.270)
Model 2	0.070	(−0.164	0.304)
Model 3	0.209	(−0.005	0.423)*
Model 4	0.222	(0.008	0.437)**
Recovery from Mental Stress[2]			
Model 1	−0.061	(−0.236	0.113)
Model 2	−0.085	(−0.273	0.102)
Model 3	−0.132	(−0.329	0.066)
Model 4	−0.133	(−0.331	0.064)
Reactivity to Orthostatic Stress[3]			
Model 1	−0.086	(−0.307	0.135)
Model 2	−0.039	(−0.268	0.189)
Model 3	0.031	(−0.217	0.278)
Model 4	0.047	(−0.207	0.300)

†Sample does not include 34 participants who had **CVD event** (definitive angina pectoris, definitive myocardial infarction, percutaneous transluminal coronary angioplasty, coronary bypass graft or stroke)

[1] Reactivity to mental stress by sleep duration = HF-HRV at mental stress - HF-HRV at baseline
[2] Recovery from mental stress by sleep duration = HF-HRV at recovery - HF-HRV at mental stress
[3] Reactivity to orthostatic stress by sleep duration = HF-HRV at orthostatic stress - HF-HRV at baseline

Note: For example
For HRV, a more negative coefficient for the reactivity associated with shorter sleep means a greater reduction in HF-HRV response to the stressor, a more positive coefficient for recovery associated with shorter sleep means a greater increase in HF-HRV during recovery.

Model 1 = age, gender, race/ethnicity, income-wealth index and respiratory rate
Model 2 = model 1 plus body mass index, smoking, alcohol consumption, medications (antihypertensive, antidepressants, sympatho-mimetic medications and medication for sleep and mood), diabetes and sleep efficiency.
Model 3 = model 2 plus sleep apnea.
Model 4 = model 3 plus naps (h/day)

*p < 0.1, **p < 0.05, ***p < 0.01

Table S5. Mean differences in log transformed **heart rate (HR)** (log (beats/min)) at baseline and mean differences in responses to mental stress challenge associated with sleep duration and insomnia with longer sleep duration with no insomnia (≥7 h sleep with no insomnia†) as reference.

	≥7 h sleep with insomnia Mean differences (95% CI)			<7 h sleep with no insomnia Mean differences (95% CI)			<7 h sleep with insomnia Mean differences (95% CI)		
Baseline									
Model 1	0.0124	(−0.039	0.064)	0.0286	(−0.009	0.066)	0.0402	(−0.002	0.082)
Model 2	0.0107	(−0.041	0.062)	0.0246	(−0.013	0.063)	0.0338	(−0.009	0.077)
Model 3	−0.0028	(−0.057	0.052)	0.0214	(−0.018	0.061)	0.0290	(−0.016	0.074)
Model 4	−0.0030	(−0.057	0.051)	0.0219	(−0.018	0.062)	0.0305	(−0.015	0.076)
Mental stress reactivity[1]									
Model 1	0.0021	(−0.014	0.018)	0.0116	0.000	0.023)*	0.0107	(−0.003	0.024)
Model 2	0.0015	(−0.014	0.018)	0.0127	0.001	0.024)***	0.0128	(−0.001	0.026)*
Model 3	−0.0003	(−0.017	0.017)	0.0104	(−0.002	0.023)	0.0147	(0.001	0.029)**
Model 4	−0.0002	(−0.017	0.017)	0.0102	(−0.002	0.023)	0.0141	(0.000	0.028)*
Recovery from Mental Stress[2]									
Model 1	0.0053	(−0.011	0.021)	−0.0032	(−0.015	0.008)	0.0016	(−0.012	0.015)
Model 2	0.0059	(−0.010	0.022)	−0.0043	(−0.016	0.007)	0.0001	(−0.013	0.013)
Model 3	0.0075	(−0.009	0.024)	−0.0016	(−0.014	0.011)	−0.0002	(−0.014	0.014)
Model 4	0.0073	(−0.010	0.024)	−0.0012	(−0.014	0.011)	0.0010	(−0.013	0.015)
Reactivity to Orthostatic Stress[3]									
Model 1	0.0117	(−0.002	0.025)	0.0059	(−0.004	0.015)	0.0128	(0.002	0.024)**
Model 2	0.0108	(−0.003	0.024)	0.0068	(−0.003	0.017)	0.0156	(0.005	0.027)***
Model 3	0.0115	(−0.003	0.025)	0.0086	(−0.002	0.019)	0.0172	(0.006	0.029)***
Model 4	0.0115	(−0.003	0.025)	0.0086	(−0.002	0.019)	0.0175	(0.006	0.029)***

[1] Reactivity to mental stress by sleep duration = HR at mental stress − HR at baseline
[2] Recovery from mental stress by sleep duration = HR at recovery − HR at mental stress
[3] Reactivity to orthostatic stress by sleep duration = HR at orthostatic stress − HR at baseline

Model 1 = age, gender, race/ethnicity, income-wealth index. Model 2 = model 1 plus body mass index, smoking, alcohol consumption, medications (antihypertensive, antidepressants, sympatho-mimetic medications and medication for sleep and mood), diabetes and sleep efficiency. Model 3 = model 2 plus sleep apnea. Model 4 = model 3 plus naps (h/day)

† < 7 hours sleep with insomnia = 3-6.9 hours/night with insomnia,
< 7 hours sleep with no insomnia = 3-6.9 hours/night with no insomnia,
≥ 7 hours sleep with insomnia = 7-8.9 hours/night with insomnia, and
≥ 7 hours sleep with no insomnia = 7-8.9 hours/night with no insomnia (reference group)

*p < 0.1, **p < 0.05, ***p < 0.01

Table S6. Mean differences in log transformed **HF-HRV** at baseline and mean differences in responses to mental stress challenge associated with sleep duration and insomnia with longer sleep duration with no insomnia (≥7 h sleep with no insomnia†) as reference group.

	≥7 h sleep with insomnia Mean differences (95% CI)			<7 h sleep with no insomnia Mean differences (95% CI)			<7 h sleep with insomnia Mean differences (95% CI)		
Baseline									
Model 1	−0.004	(−0.443	0.435)	−0.360	(−0.679	−0.042)**	−0.397	(−0.756	−0.037)**
Model 2	0.013	(−0.425	0.451)	−0.301	(−0.624	0.021)*	−0.317	(−0.683	0.049)*
Model 3	0.024	(−0.432	0.479)	−0.286	(−0.619	0.048)*	−0.265	(−0.642	0.113)
Model 4	0.025	(−0.431	0.481)	−0.290	(−0.624	0.045)*	−0.276	(−0.660	0.108)
Mental stress reactivity[1]									
Model 1	−0.251	(−0.490	−0.011)**	−0.146	(−0.319	0.028)	−0.228	(−0.424	−0.032)**
Model 2	−0.246	(−0.488	−0.005)**	−0.153	(−0.330	0.024)	−0.225	(−0.426	−0.023)**
Model 3	−0.242	(−0.499	0.015)*	−0.153	(−0.340	0.035)	−0.253	(−0.466	−0.041)**
Model 4	−0.238	(−0.495	0.019)*	−0.163	(−0.351	0.025)	−0.286	(−0.502	−0.069)***
Recovery from Mental Stress[2]									
Model 1	0.194	(−0.046	0.433)	0.187	(0.014	0.361)**	0.250	0.053	0.447)**
Model 2	0.188	(−0.054	0.429)	0.202	(0.025	0.380)**	0.242	0.040	0.444)**
Model 3	0.141	(−0.115	0.398)	0.178	(−0.010	0.366)*	0.241	0.028	0.454)**
Model 4	0.140	(−0.117	0.396)	0.182	(−0.006	0.370)*	0.252	0.035	0.469)**
Reactivity to Orthostatic Stress[3]									
Model 1	−0.236	(−0.477	0.005)	0.027	(−0.144	0.199)	−0.164	(−0.358	0.031)*
Model 2	−0.197	(−0.440	0.046)	0.036	(−0.139	0.210)	−0.169	(−0.368	0.029)*
Model 3	−0.247	(−0.501	0.007)	0.018	(−0.166	0.202)	−0.196	(−0.405	0.013)*
Model 4	−0.245	(−0.499	0.009)	0.001	(−0.183	0.186)	−0.236	(−0.448	−0.024)**

[1] Reactivity to mental stress by sleep duration = HF-HRV at mental stress − HF-HRV at baseline
[2] Recovery from mental stress by sleep duration = HF-HRV at recovery − HF-HRV at mental stress
[3] Reactivity to orthostatic stress by sleep duration = HF-HRV at orthostatic stress − HF-HRV at baseline

Model 1 = age, gender, race/ethnicity, income-wealth index. Model 2 = model 1 plus body mass index, smoking, alcohol consumption, medications (antihypertensive, antidepressants, sympatho-mimetic medications and medication for sleep and mood), diabetes and sleep efficiency. Model 3 = model 2 plus sleep apnea. Model 4 = model 3 plus naps (h/day)

† < 7 hours sleep with insomnia = 3-6.9 hours/night with insomnia,
< 7 hours sleep with no insomnia = 3-6.9 hours/night with no insomnia,
≥ 7 hours sleep with insomnia = 7-8.9 hours/night with insomnia, and
≥ 7 hours sleep with no insomnia = 7-8.9 hours/night with no insomnia (reference group)

*p < 0.1, ** p < 0.05, ***p < 0.01