

Personality, Falls and Fractures in Older Women: WHI-OS

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"Health is a state of complete physical, mental, and social well-being, and not merely the absence of disease and infirmity." -- World Health Organization (1946)

Twitter Topics Negatively Correlated With County-Level AHD Mortality

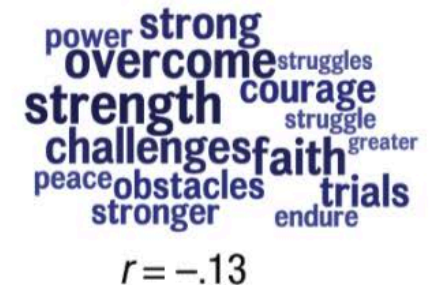
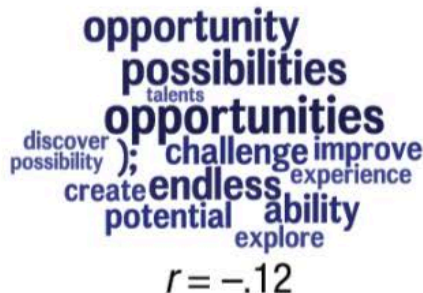
Skilled
Occupations



Positive
Experiences

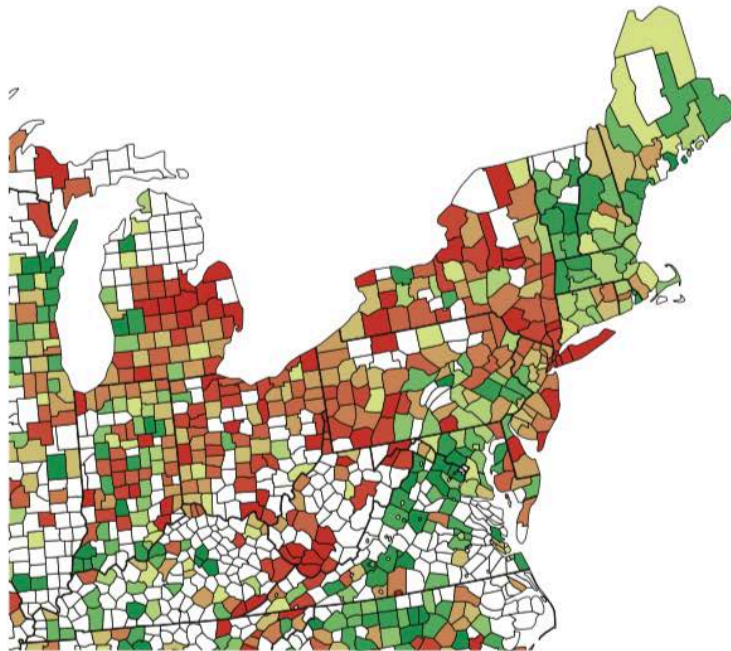


Optimism

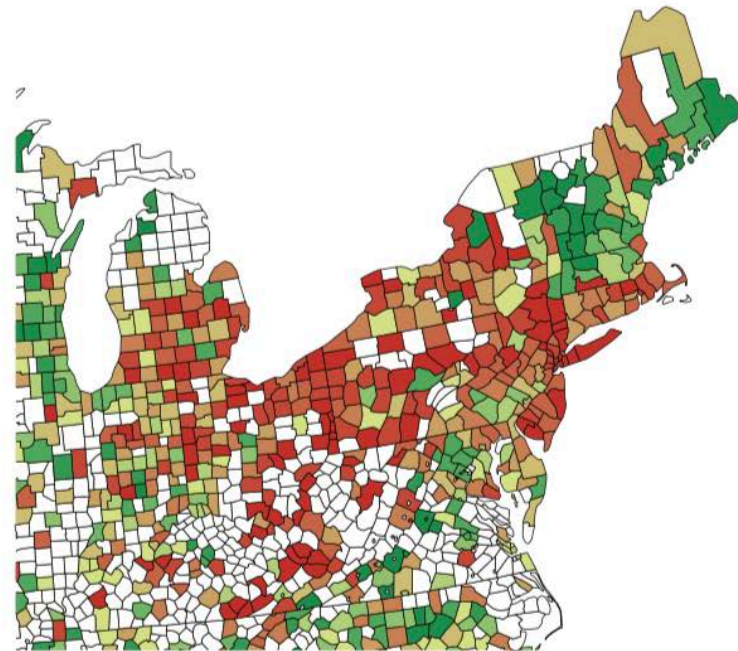


CDC predicted Averages of Community level CHD mortality and Twitter language predicted CHD mortality in NE United States

CDC-Reported AHD Mortality



Twitter-Predicted AHD Mortality



10 20 30 40 50 60 70 80 90

AHD Mortality (Percentile)

Personality Traits and Chronic Disease

- Trait optimism (positive future expectations)
- Trait pessimism (negative future expectations)
- Cynical hostility (mistrust of people)

Mechanisms for Influencing Disease

- Adoption of health behaviors
 - Physical activity
 - Risk taking behaviors
- Activation of stress response systems
 - Calibration of neural, cardiac, endocrine & immune physiology
- Adherence to preventive therapy & treatment
 - e.g. Willingness to stop smoking

Personality and Health: Psychophysiological Processes

Autonomic Dysfunctional/HPA Axis

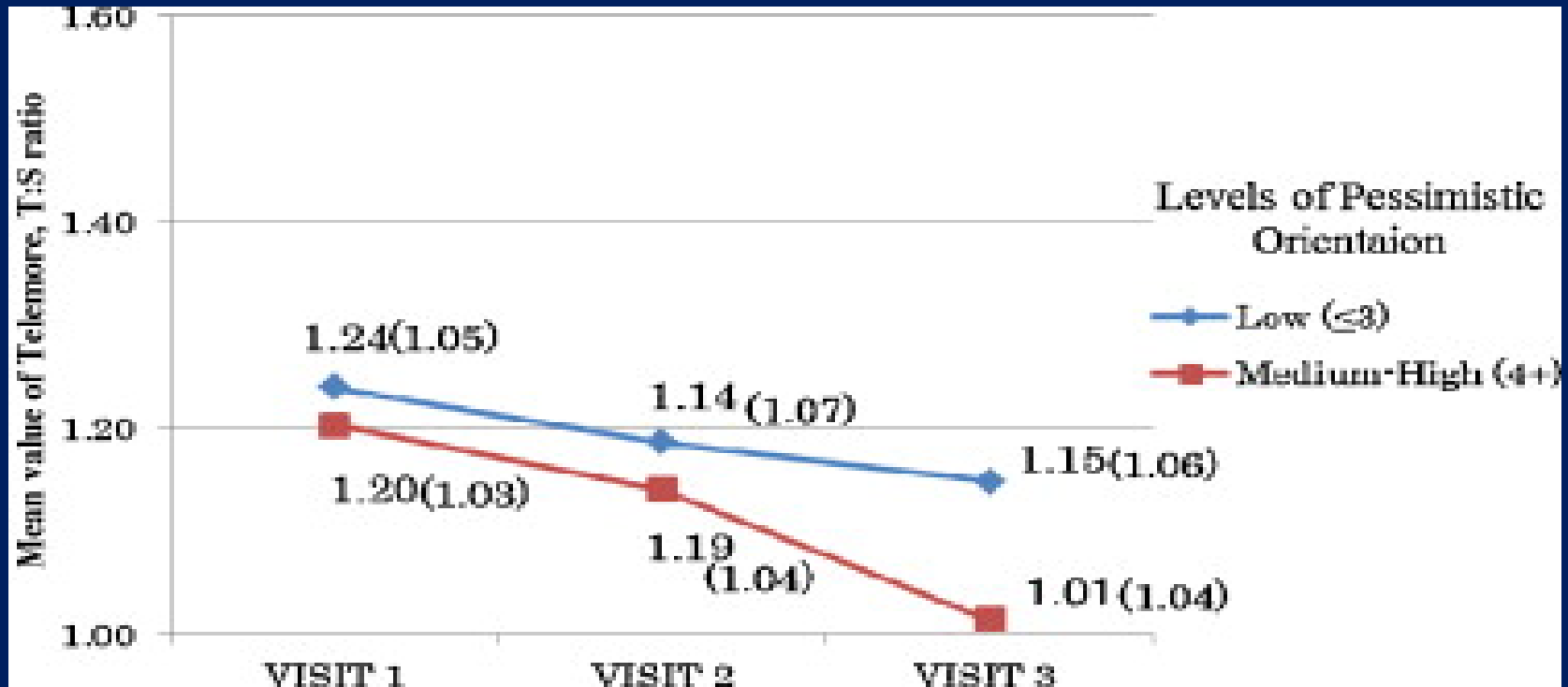
- Hostility impairs stress buffering effects of social support.
- Optimists have healthier relationships & cope better with adversity.
- Different parts of the brain are activated in Optimists vs Pessimists.
- Optimists: Lower cortical awakening response.

Personality and Health: Psychophysiological Processes

Inflammation

- **Pessimist: Elevated inflammatory markers (immunosenescence)**
- **Thrombogenesis**

Mean Telomere length (SD) according to two levels of pessimism (low (≤ 3) vs. medium to high (4+))



Environmental Determinants of Attitudes

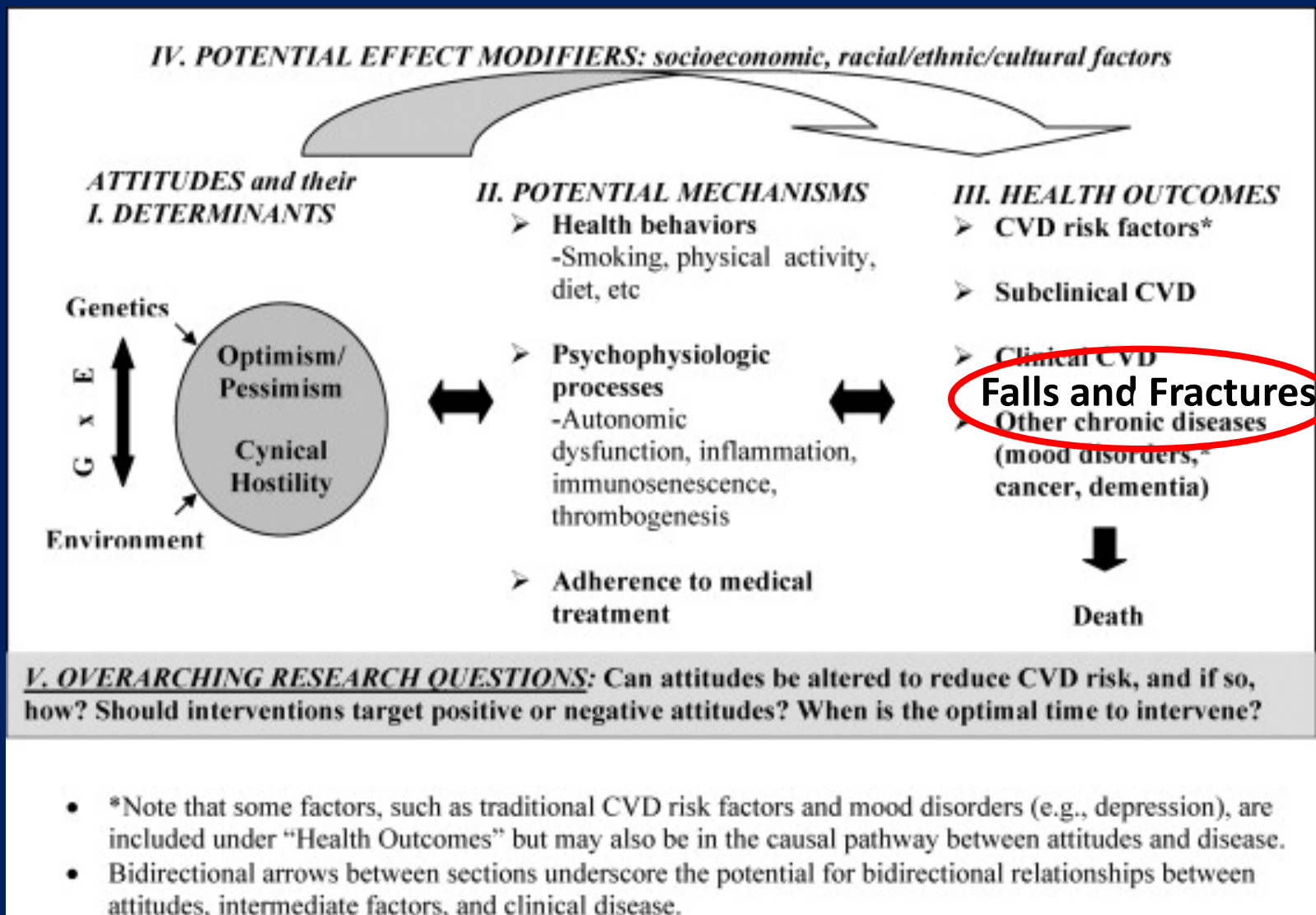
- **Familial, cultural and societal factors influence attitudes e.g., obesity**
- **Correlations with socio- economic status**
- **Depression**

Genetic Determinant of Attitudes

Heritability

- Optimism: 24%
- Pessimism: 29%

Conceptual Model for Ongoing Research into Attitudes and Health over the Lifecourse



Research Question

- Are personality traits associated with Fractures/Falls in older women
- Are these associations independent of established risk factors?

Study Population: Women's Health Initiative

- **N=93676 women In the OS**
- **Age: 50-79**
- **Exclusions:**
 - **No follow-up n=627**
 - **No response on falls question n= 162**
 - **Missing optimism construct n=2580**
 - **Missing hostility construct n= 3903**
- **Analytic sample: N= 87, 343**

Measurement of Optimism: LIFE Orientation Test Revised (LOT-R)

[0]= strongly disagree; [1]= disagree; [2]=neutral; [3]=agree; [4]=strongly agree

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.

Scoring:

1. Reverse code items 3,7 and 9 prior to scoring (0=4, (1=3), (2=2), 3=1), (4=0).
2. Sum items 1,3,4,7,9 and 10 to obtain an overall score.

Note: Items **2, 5, 6 and 8** are filler items only. They are not scored as part of the revised scale.

Measurement of Cynical Hostility

Cynicism subscale: Cook Medley Questionnaire
13-items: True/False

Higher scores = Greater hostility

Sample Questions:

- **I have often had to take orders from someone who did not know as much as I did.**
- **It is safer to trust nobody.**
- **No one cares much what happens to you.**
- **I think most people would lie to get ahead.**

Who are the more **Optimistic** women?



	Optimism Quartiles				P trend
	Q1 (least)	Q2	Q3	Q4 (most)	
Age (yr)	63.6	63.8	63.6	63.0	<0.001
Race/Ethnicity (%)					<0.001
White	79.1	85.4	86.7	87.5	
Black	8.8	6.8	7.1	7.5	
Hispanic	5.5	3.2	2.8	2.4	
Asian	4.5	3.1	2.2	1.5	
Education <High School (%)	30.5	22.2	17.7	12.8	<0.001
Physical activity (MET hr/wk)	13.6	13.8	14.4	15.3	<0.001

Who are the more **Optimistic** women?



	Optimism Quartiles				P trend
	Q1 (least)	Q2	Q3	Q4 (most)	
Alcohol (≥ 7 /wk)	10.2	12.4	13.5	15.3	<0.001
Current smoker (%)	8.0	5.7	5.7	5.2	<0.001
Fell ≥ 2 in 12 months (%)	15.1	12.2	11.1	10.6	<0.001
Body mass index (kg/m ²)	27.9	27.2	27.0	26.8	<0.001
Depression score (CESD)	0.092	0.032	0.023	0.015	<0.001
Diabetes (%)	5.9	3.9	3.3	2.8	<0.001
Poor health status (%)	17.5	8.9	6.4	3.8	<0.001
Hormone therapy (never used)	43.3	39.5	38.9	38.0	<0.001
Femoral neck BMD (g/cm ²)*	0.723	0.712	0.713	0.715	0.038
Spine BMD (g/cm ²)*	0.985	0.977	0.976	0.979	0.49

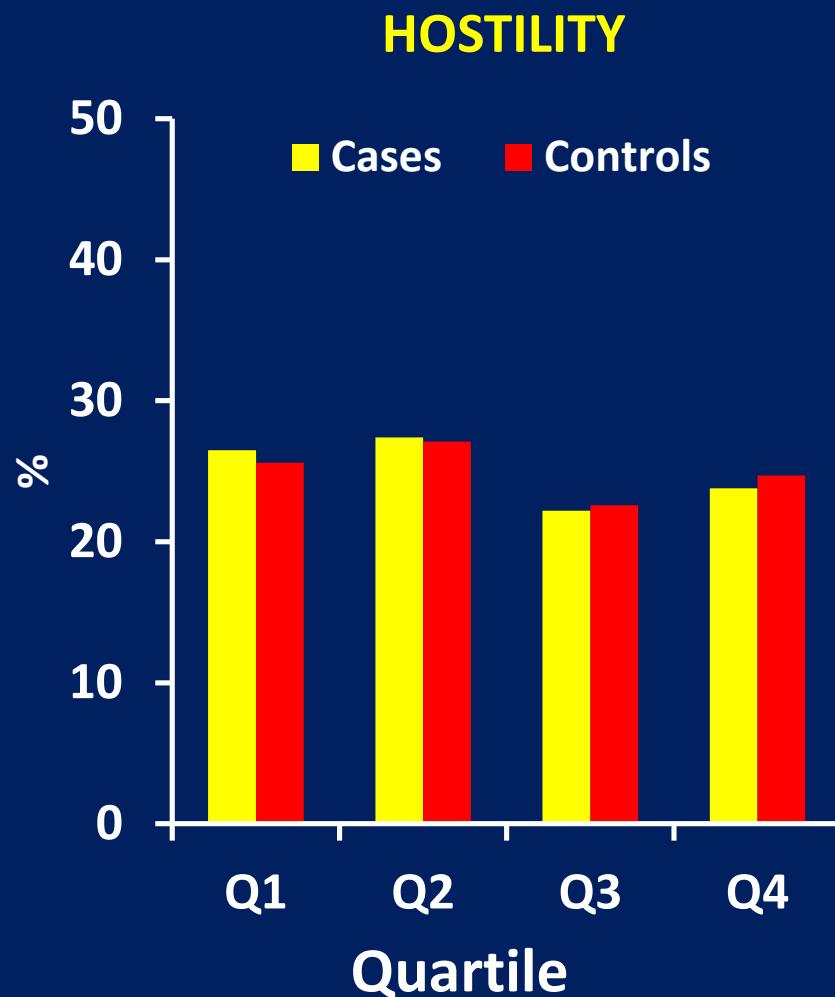
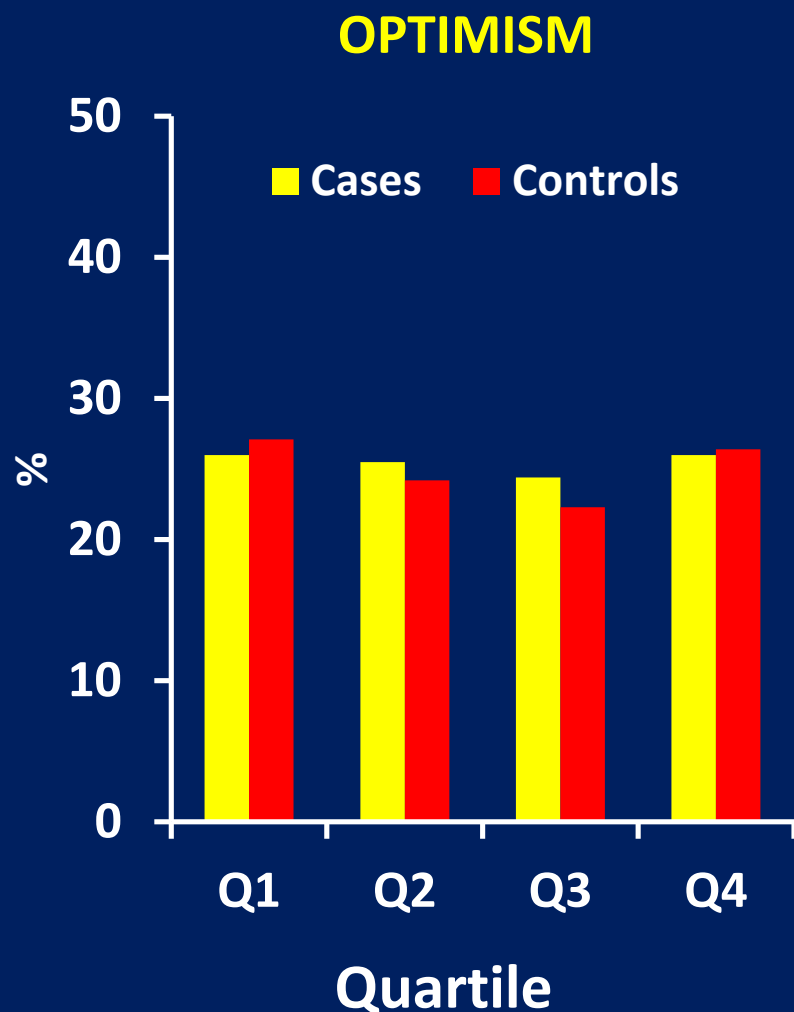
Personality,: Falls and Fractures

- **Fractures: average follow-up 11.4 years; Hip Fx adjudicated(during study and Extension 1); others self report.**
 - **Exclude Fx: ribs, sternum, skull, face, fingers, toes and cervical vertebrae)**
- **Falls: Annual report of falling ≥ 2 times in past year; repeated measures; average follow up 7.6 years; No information on falls during extensions**

Personality Traits by Incident Hip Fracture Status: WHI

	<u>Optimism</u>	<u>Hostility</u>
Hip Fracture	Mean (SD)	MEAN (SD)
Yes	23.3 (3.4)	3.6 (2.8)
No	23.3 (3.5)	3.7 (2.8)
p trend	0.99	0.156

Personality Trait by Incidence Hip Fracture Status: WHI



Repeated Logistic Regression of Falls by Optimism and Hostility (n=87,342)

	Age-adjusted	Fully- adjusted**
OPTIMISM		
Continuous*	0.84 (0.83, 0.85)	0.95 (0.94, 0.97)
0.6 - 21.0	1.0 (ref)	1.0 (ref)
22.0 - 23.0	0.79 (0.76, 0.82)	0.91 (0.87, 0.95)
24.0 - 25.0	0.71 (0.68, 0.73)	0.87(0.83, 0.91)
26.0 - 30.0	0.67(0.64, 0.70)	0.89(0.85, 0.93)
HOSTILITY		
Continuous*	1.12 (1.11, 1.14)	1.04 (1.03, 1.06)
0.0 - 1.0	1.0 (ref)	1.0 (ref)
2.0 - 3.0	1.10 (1.06, 1.15)	1.05 (1.00, 1.09)
4.0 - 5.0	1.18 (1.13, 1.23)	1.08 (1.04, 1.13)
6.0 - 13.0	1.35 (1.29, 1.40)	1.12 (1.07, 1.17)

* OR expressed a 1 standard deviation. ** Adjusted for age, region, weight, height, diabetes, ethnicity/race, physical activity, smoking status, general health status, current hormone therapy use, total calcium and D intake, depression score, antidepressants, and hypnotics,

Repeated Logistic Regression of Falls by Optimism and Hostility: MV models adj for the alternate construct

MV + Hostility

OPTIMISM

Continuous*	0.96 (0.94, 0.97)
0.6 - 21.0	1.0 (ref)
22.0 - 23.0	0.92 (0.88, 0.96)
24.0 - 25.0	0.88 (0.84, 0.92)
26.0 - 30.0	0.91 (0.87, 0.95)

HOSTILITY

MV + Optimism

Continuous*	1.03 (1.02, 1.05)
0.0 - 1.0	1.0 (ref)
2.0 - 3.0	1.04 (1.00, 1.08)
4.0 - 5.0	1.07 (1.03, 1.12)
6.0 - 13.0	1.09 (1.05, 1.14)

* OR expressed a 1 standard deviation.

Relative Hazard for *Hip* Fracture (n=2,904) by Personality Trait

	Age-adjusted	MV -adjusted*
OPTIMISM		
Continuous (per SD)	0.94 (0.90, 0.97)	0.99 (0.95, 1.03)
Quartile 1 (low)	1.00 (ref)	1.00 (ref)
Quartile 2	0.97 (0.87, 1.07)	1.00 (0.90, 1.12)
Quartile 3	0.90 (0.81, 1.00)	0.97 (0.86, 1.08)
Quartile 4 (high)	0.90 (0.81, 0.99)	1.03 (0.92, 1.15)
HOSTILITY		
Continuous (per SD)	1.02 (0.98, 1.06)	1.02 (0.98, 1.06)
Quartile 1 (low)	1.00 (ref)	1.00 (ref)
Quartile 2	0.99 (0.90, 1.09)	0.97 (0.87, 1.07)
Quartile 3	0.98 (0.88, 1.09)	0.97 (0.87, 1.08)
Quartile 4 (high)	1.03 (0.93, 1.15)	1.01 (0.91, 1.13)

* Adjusted for age, weight, height, diabetes, ethnicity/race, clinic site, smoking status, fall in past 12-months, general health status, current hormone therapy use, oral glucocorticoid use, total calcium and D intake, antidepressants, depression score, physical activity, previous fracture and hypnotics

Relative Hazard for *Total Fractures* (n=26,715) by Personality Trait

	Age-adjusted	MV -adjusted*
OPTIMISM		
Continuous (per SD)	0.96 (0.95, 0.97)	1.00 (0.99, 1.02)
Quartile 1 (low)	1.00 (ref)	1.00 (ref)
Quartile 2	0.95 (0.91, 1.08)	0.99 (0.96, 1.03)
Quartile 3	0.92 (0.89, 0.95)	1.00 (0.96, 1.04)
Quartile 4 (high)	0.90 (0.87, 0.93)	1.00 (0.97, 1.04)
HOSTILITY		
Continuous (per SD)	1.03 (0.2, 1.04)	1.02 (1.01, 1.03)
Quartile 1 (low)	1.00 (ref)	1.00 (ref)
Quartile 2	1.04 (1.01, 1.08)	1.02 (0.98, 1.05)
Quartile 3	1.07 (1.03, 1.10)	1.04 (1.01, 1.08)
Quartile 4 (high)	1.08 (1.04, 1.12)	1.05 (1.01, 1.09)

*Adjusted for age, weight, height, diabetes, ethnicity/race, clinic site, smoking status, fall in past 12-months, general health status, current hormone therapy use, oral glucocorticoid use, total calcium and D intake, antidepressants, depression score, physical activity, previous fracture and hypnotics

Strengths

- Well characterized cohort;
- Validated measures of Optimism and Hostility(previously linked with CVD in WHI);
- We adjusted optimism models for hostility (and visa versa) to test whether associations were independent of each other;
- Repeated measure approach to falls;
- 4 different fracture outcomes.

Weaknesses

- **Except for hip Fractures we relied on self report of fractures**
 - **Chen Z: agreement BTW self report and radiographic report for Fx is 76% in WHI;**
- **Could not adjust for BMD**
- **Residual confounding by unmeasured factors**

Conclusions

- **Optimism and Cynical Hostility were associated with recurrent falls.**
- **Independent of fall risk factors**
- **Modest association with fractures was explained by other risk factors**
- **Support conceptual models of how personality may influence disease outcomes**

Opportunities for Intervention

- **Can attitudes be altered to reduce risk of chronic disease; if yes, how?**
 - **Cognitive behavioral therapy**
- **Should interventions target positive or negative attitudes?**
- **When is the optimal time to intervene?**
 - **Are attitudes malleable only up to a certain point in early adulthood?**

