

Table S1. Age-standardized baseline characteristics of the Nurses' Health Study (N=69,744) and Normative Aging Study (N=1,429).

	Nurses' Health Study: Optimism levels by LOT-R score quartile (Q1 = least optimistic)					Normative Aging Study: Optimism levels by PSM-R score quintile (Q1 = least optimistic)					
	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q5	
Demographics:											
Mean age at baseline (SD) [✱]	70.8 (7.1)	70.3 (6.9)	69.2 (6.7)	69.0 (6.7)	***	62.8 (8.9)	61.5 (8.2)	61.6 (8.4)	60.7 (8.2)	61.3 (7.6)	*
White (%)	98	97	98	98	*	97	95	97	98	96	
Married (%)	67	69	71	71	***	87	89	91	89	88	
Associate/RN degree (%)	68	63	60	58	***	--	--	--	--	--	
Education (year)	--	--	--	--		13.7 (2.1)	13.8 (2.3)	14.0 (2.0)	14.1 (1.9)	14.6 (2.0)	***
Husband's Education											
▪ < high school graduate (%)	5	4	3	4	***	--	--	--	--	--	
▪ high school graduate (%)	32	30	30	28		--	--	--	--	--	
▪ > high school graduate (%)	38	43	46	46		--	--	--	--	--	
▪ missing (%)	25	23	21	22		--	--	--	--	--	
Family income [†]	--	--	--	--		10.9 (2.0)	11.1 (2.0)	11.4 (2.1)	11.7 (1.9)	11.8 (1.9)	***
Father's occupation ^{††}											
▪ craftsmen, laborer, farmer (%)	10	9	9	9	***	--	--	--	--	--	
▪ clerical, sales, service (%)	28	26	25	24		--	--	--	--	--	
▪ professional, managerial (%)	62	64	66	67		--	--	--	--	--	
Health conditions:											
Depression [§] (%)	20	13	10	8	***	22	3	3	1	0	***
High cholesterol (%)	72	69	67	65	***	91	92	94	93	93	
Hypertension (%)	63	59	57	54	***	44	45	38	40	36	
Type 2 diabetes (%)	14	11	9	9	***	8	2	3	2	3	*
Myocardial infarction (%)	3	3	2	2	***	--	--	--	--	--	

	Nurses' Health Study: Optimism levels by LOT-R score quartile (Q1 = least optimistic)				Normative Aging Study: Optimism levels by PSM-R score quintile (Q1 = least optimistic)					
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q5	
Heart disease (%)	--	--	--	--	16	15	10	14	11	
Stroke (%)	3	3	3	2 ***	4	1	2	2	1	
Cancer (%)	10	10	9	9 **	2	4	3	3	3	
<u>Health behaviors:</u>										
Smoking status										
▪ never (%)	43	45	45	48 ***	24	29	28	26	31	
▪ past (%)	48	48	48	46	54	47	47	57	47	
▪ current (%)	8	8	6	6	22	23	25	16	22	
Alcohol consumption										
▪ <15 grams/day (%)	85	84	83	84 ***	--	--	--	--	--	
▪ 15+ grams/day (%)	12	13	15	14	--	--	--	--	--	
▪ missing (%)	3	2	2	2	--	--	--	--	--	
▪ none-moderate (%)	--	--	--	--	64	72	74	78	76 ***	
▪ former (%)	--	--	--	--	13	7	10	11	5	
▪ heavy/problematic (%)	--	--	--	--	23	20	16	11	19	
Weekly MET hours of physical activity										
▪ <3 (%)	26	19	16	16 ***	--	--	--	--	--	
▪ 3 - <9 MET hrs/week (%)	22	20	19	18	--	--	--	--	--	
▪ 9 - <18 MET hrs/week (%)	19	21	21	20	--	--	--	--	--	
▪ 18 - <27 MET hrs/week (%)	12	13	14	15	--	--	--	--	--	
▪ 27+ MET hrs/week (%)	20	26	29	31	--	--	--	--	--	
▪ missing (%)	1	1	1	1	--	--	--	--	--	
Physical activity: mean kcal expended/week	--	--	--	--	2131.0 (1095.7)	2387.6 (1108.2)	2747.0 (1586.3)	2666.9 (1321.1)	2816.2 (1496.5)	**
Mean AHEI diet score ^{§§}	54.6 (15.2)	56.9 (14.6)	58.5 (14.5)	59.0 (14.7) ***	--	--	--	--	--	
Fruit and vegetable: mean servings/day	--	--	--	--	4.9 (1.5)	5.1 (1.5)	5.0 (1.5)	5.0 (1.4)	5.1 (1.7)	

	Nurses' Health Study: Optimism levels by LOT-R score quartile (Q1 = least optimistic)					Normative Aging Study: Optimism levels by PSM-R score quintile (Q1 = least optimistic)					
	Q1	Q2	Q3	Q4		Q1	Q2	Q3	Q4	Q5	
Mean BMI (kg/m ²)	26.6 (6.4)	26.2 (6.0)	26.0 (5.8)	26.0 (5.8)	***	27.4 (2.6)	27.4 (2.9)	26.9 (2.5)	26.8 (2.3)	26.5 (2.2)	**
Physician visit											
▪ for screening in previous year (%)	84	87	89	89	***	--	--	--	--	--	
▪ in past 3 years (%)	--	--	--	--		95	96	96	96	91	*

Notes: Values are means (standard deviations, SD) or percentages and were standardized to the age distribution of the study population. Values of polytomous variables may not sum to 100% due to rounding. In NHS, LOT-R quartile cut-points are: Q1 (least optimistic), ≤ 16 points (n=20,712); Q2, 17-20 points (n=19,615); Q3, 21-23 (n=17,173); Q4 (most optimistic): > 23 points (n=12,244). In NAS, PSM-R quintile cut-points are: Q1 (least optimistic), > 53.3 points (n=285); Q2, 48.2 to < 53.3 points (n=286); Q3, 42.8 to < 48.2 points (n=286); Q4, 37.2 to < 42.8 points (n=287); Q5 (most optimistic), < 37.2 points. PSM-R cut-points shown here are in the original metric (i.e., before reverse-scoring and not age-adjusted) to facilitate comparison with previous studies and future replication. PSM-R scores were reverse-coded prior to analysis, such that for results reported in Tables 2, 3, S1-S3, higher scores represent higher levels of optimism.

To compare differences in the age-standardized values of each variable by optimism categories in each cohort, we used analysis of covariance for continuous variables and multinomial logistic regression for categorical variables. All analyses adjusted for baseline age (except for analyses with age as the dependent variable). Asterisks provided in the last column for each cohort denote the statistical significance of the age-adjusted, overall association of optimism with each variable: * $p < .05$, ** $p < .01$, *** $p < .001$.

* Values are not age adjusted.

† Family income is in 1986 dollars and ranges from 0=under \$3,000 to 16=\$75,000+.

†† Father's occupation in NAS was coded as: 0=unskilled, 1=semi-skilled, 2=skilled and foreman, 3=white collar, 4=semi-professional, 5=professional/managerial/proprietary.

§ Depression in NHS was defined by self-reported physician diagnosis, antidepressant use, or symptoms assessed via Center for Epidemiologic Studies Depression Scale-Revised (CES-D). Depression in NAS was defined as T -score ≥ 70 on the Symptom Checklist 90-Revised (SCL-90-R).

§§ Alternative healthy eating index considered 11 diet components related to chronic disease risk.

Table S2. Sensitivity analyses excluding participants with prevalent chronic diseases at baseline: Percent differences in lifespan associated with optimism in Nurses' Health Study, 2004-2014 (n=53,792), and Normative Aging Study, 1986-2016 (n=1,135).

	Optimism Level (Q1 = least optimistic)											
	Q1		Q2		Q3		Q4		Q5		Continuous	
	% difference	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI	
a) Nurses' Health Study (Q = Quartile)												
DM	0.0	Ref.	8.0	5.6, 10.4	12.9	10.2, 15.6	15.0	11.8, 18.1	--	--	6.2	5.2, 7.1
DM + HC	0.0	Ref.	6.9	4.5, 9.4	11.5	8.8, 14.2	13.0	9.9, 16.2	--	--	5.3	4.3, 6.3
DM + HC + HB	0.0	Ref.	3.8	1.4, 6.2	6.7	4.0, 9.4	7.9	4.7, 11.0	--	--	2.9	1.9, 3.9
(b) Normative Aging Study (Q = Quintile)												
DM	0.0	Ref.	7.2	-2.5, 17.8	4.6	-4.8, 14.9	9.2	-0.7, 20.2	11.5	1.2, 22.7	3.8	0.7, 7.0
DM + HC	0.0	Ref.	4.9	-5.0, 16.0	2.0	-7.6, 12.5	5.8	-4.4, 17.1	7.8	-2.7, 19.4	2.6	-0.7, 6.0
DM + HC + HB	0.0	Ref.	4.4	-5.4, 15.2	3.8	-5.9, 14.5	3.7	-6.3, 14.8	5.6	-4.6, 16.9	1.9	-1.4, 5.3

Notes: DM = Demographics model; HC = Health conditions; HB = Health behaviors. CI = Confidence interval. Ref. = Reference. Optimism was assessed with the LOT-R in NHS and PSM-R in NAS. For both cohorts, higher continuous scores represent higher levels of optimism. For NHS, women with a history of type 2 diabetes, cancer, stroke, or myocardial infarction at baseline were excluded. The demographics model includes baseline age, race, marital status, education, husband's education, and father's occupation. Health conditions include high cholesterol, hypertension, and depression at baseline. Health behaviors include smoking status, physical activity, alcohol consumption, screening, body-mass index, and diet. For NAS, men with a history of type 2 diabetes, coronary heart disease, stroke, or cancer at baseline were excluded. The demographics model includes baseline age, being white, being married, education, family income, and father's occupation. Health conditions include high cholesterol, hypertension, and depression at baseline. Health behaviors include smoking status, alcohol use, physical activity, fruit and vegetable intake, body-mass index, and physician visit in the past 3 years assessed at baseline.

Table S3. Sensitivity analyses excluding participants with prevalent chronic diseases at baseline: Odds ratios for the association of optimism with survival to age 85+, Nurses' Health Study (n=8,886) and Normative Aging Study (n=849).

	Optimism Level (Q1 = least optimistic)											
	Q1		Q2		Q3		Q4		Q5		Continuous	
	OR	--	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
a) Nurses' Health Study (Q = Quartile)												
DM	1.0	Ref.	1.2	1.0, 1.4	1.5	1.3, 1.8	1.5	1.2, 1.8	--	--	1.2	1.1, 1.3
DM + HC	1.0	Ref.	1.1	1.0, 1.3	1.5	1.2, 1.8	1.4	1.1, 1.8	--	--	1.2	1.1, 1.3
DM + HC + HB	1.0	Ref.	1.1	0.9, 1.2	1.3	1.1, 1.6	1.2	1.0, 1.5	--	--	1.1	1.0, 1.2
(b) Normative Aging Study (Q = Quintile)												
DM	1.0	Ref.	1.4	0.9, 2.2	1.1	0.7, 1.8	1.4	0.9, 2.3	1.8	1.1, 2.8	1.2	1.0, 1.3
DM + HC	1.0	Ref.	1.4	0.9, 2.3	1.2	0.7, 1.9	1.4	0.9, 2.3	1.7	1.0, 2.8	1.1	1.0, 1.3
DM + HC + HB	1.0	Ref.	1.4	0.8, 2.2	1.1	0.7, 1.9	1.3	0.8, 2.1	1.5	0.9, 2.5	1.1	0.9, 1.3

Notes: DM = Demographics model; HC = Health conditions; HB = Health behaviors. CI = Confidence interval. Ref. = Reference. Optimism was assessed with the LOT-R in NHS and PSM-R in NAS. For both cohorts, higher continuous scores represent higher levels of optimism. For NHS, women with a history of type 2 diabetes, cancer, stroke, or myocardial infarction at baseline were excluded. The demographics model includes baseline age, race, marital status, education, husband's education, and father's occupation. Health conditions include high cholesterol, hypertension, and depression at baseline. Health behaviors include smoking status, physical activity, alcohol consumption, screening, body-mass index, and diet. For NAS, men with a history of type 2 diabetes, coronary heart disease, stroke, or cancer at baseline were excluded. The demographics model includes baseline age, being white, being married, education, family income, and father's occupation. Health conditions include high cholesterol, hypertension, and depression at baseline. Health behaviors include smoking status, alcohol use, physical activity, fruit and vegetable intake, body-mass index, and physician visit in the past 3 years assessed at baseline.

Table S4. Sensitivity analyses adjusting for social integration: Percent differences in lifespan associated with optimism in Nurses' Health Study, 2004-2014 (n=67,846), and Normative Aging Study, 1986-2016 (n=1,339).

	Optimism Level (Q1 = least optimistic)											
	Q1		Q2		Q3		Q4		Q5		Continuous	
	% difference	Ref.	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI
a) Nurses' Health Study (Q = Quartile)												
DM	0.0	Ref.	9.0	7.0, 11.1	14.8	12.5, 17.2	17.2	14.5, 19.9	--	--	7.4	6.5, 8.2
DM + HC + SI	0.0	Ref.	7.0	5.0, 9.1	11.7	9.4, 14.1	13.5	10.8, 16.2	--	--	5.7	4.9, 6.5
DM + HC + SI + HB	0.0	Ref.	4.1	2.1, 6.2	7.5	5.2, 9.8	8.6	5.9, 11.3	--	--	3.6	2.8, 4.4
(b) Normative Aging Study (Q = Quintile)												
DM	0.0	Ref.	5.9	-3.0, 15.7	8.0	-1.1, 17.8	10.7	1.4, 20.9	12.6	3.0, 23.2	4.0	1.1, 7.0
DM + HC + SI	0.0	Ref.	4.3	-4.4, 13.8	6.0	-2.8, 15.5	7.7	-1.2, 17.5	9.7	0.4, 19.2	3.0	0.2, 6.0
DM + HC + SI + HB	0.0	Ref.	5.1	-3.6, 14.5	6.9	-2.0, 16.5	6.0	-2.9, 15.6	8.6	-0.5, 18.7	3.3	0.4, 6.3

Notes: DM = Demographics model; HC = Health conditions; SI = Social integration; HB = Health behaviors. CI = Confidence interval. Ref. = Reference. Optimism was assessed with the LOT-R in NHS and PSM-R in NAS. For both cohorts, higher continuous scores represent higher levels of optimism. Analyses were restricted to those with non-missing values for social integration. If values were missing for any component of the social integration score, the social integration score was recorded as missing. For NHS, the demographics model includes baseline age, race, marital status, education, husband's education, and father's occupation. Health conditions include high cholesterol, hypertension, type 2 diabetes, myocardial infarction, stroke, and cancer at baseline. Health behaviors include smoking status, physical activity, alcohol consumption, screening, body-mass index, and diet. For NAS, the demographics model includes baseline age, being white, being married, education, family income, and father's occupation. Health conditions include high cholesterol, hypertension, type 2 diabetes, heart disease, stroke, and cancer at baseline. Health behaviors include smoking status, alcohol use, physical activity, fruit and vegetable intake, body-mass index, and physician visit in the past 3 years assessed at baseline.

Section S5. Definitions of optimism.

Optimism has been defined either as a disposition or based on attributions. Dispositional optimism refers to the relatively stable, generalized expectation that positive outcomes will occur across life domains (Scheier & Carver, 1985, 2018). Attribution-style optimism is inferred from one's explanations for prior events (Carver, Scheier, & Segerstrom, 2010). An optimistic explanatory style is characterized by the belief that the future will be pleasant because one can control important outcomes (Peterson et al., 1998; Seligman, 1991). A pessimistic explanatory style has been linked to a sense of hopelessness and is marked by the view that problems are permanent and reflect one's shortcomings (Jenkins, 1996; Kamen & Seligman, 1987; Seligman, 1991). Individuals with an optimistic explanatory style appraise the causes of positive events as internal, stable, and global, and the causes of negative events as external, transient, and specific. These two forms of optimism are moderately correlated (Peterson & Vaidya, 2001); both are consistently associated with physical health outcomes (Rasmussen, Scheier, & Greenhouse, 2009). In the present study, dispositional optimism was assessed using the Life Orientation Test-Revised (LOT-R; Scheier, Carver, & Bridges, 1994) in NHS, and attributional-style optimism was assessed using the Revised Optimism-Pessimism Scale (PSM-R; Malinchoc, Offord, & Colligan) in NAS.

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