Dispositional Optimism Protects Older Adults From Stroke

The Health and Retirement Study

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Background and Purpose—Although higher optimism has been linked to an array of positive health outcomes, the association between optimism and incidence of stroke remains unclear, especially among older adults. We examined whether higher optimism was associated with a lower incidence of stroke.

Method—Prospective data from the Health and Retirement Study—a nationally representative panel study of American adults aged $\geq$ 50 years—were used. Analyses were conducted for a 2-year follow-up on the subset of 6044 adults (2542 men, 3502 women) who were stroke-free at baseline. Analyses adjusted for chronic illnesses, self-rated health, and relevant sociodemographic, behavioral, biological, and psychological factors.

Results—Higher optimism was associated with a lower risk of stroke. On an optimism measure ranging from 3 to 18, each unit increase in optimism was associated with an age-adjusted OR of 0.90 for stroke (95% CI, 0.84 to 0.97; $P < 0.01$). The effect of optimism remained significant even after fully adjusting for a comprehensive set of sociodemographic, behavioral, biological, and psychological stroke risk factors.

Conclusions—Optimism may play an important role in protecting against stroke among older adults. (Stroke. 2011;42: 00-00.)

Key Words: epidemiology ■ optimism ■ psych & behavior ■ public health ■ stroke

Accumulating research suggests that positive psychological factors such as optimism are associated with a range of cardiovascular health benefits, including lower risk of rehospitalization after bypass surgery,1 reduced risk of coronary heart disease,2,3 and reduced risk of cardiovascular mortality.3-4 To date, however, few studies have examined the relationship between optimism and stroke.

A recent study among Finnish adults found an association between low pessimism and reduced risk of stroke but no link between optimism and stroke;5 optimism and pessimism are correlated but distinct constructs with different outcomes.6,7 This study, however, did not include older adults (age $>54$ years), leaving unanswered the question of whether these findings generalize to older adults. Considering that the risk of stroke is highest among older adults, further research with older samples is needed. Hence, using longitudinal data from the Health and Retirement Study, our aim was to examine the relationship between dispositional optimism—the general expectation that more good things, rather than bad, will happen in the future8—and incidence of stroke among older adults. Although optimism is related to other positive psychological constructs such as positive affect—positive emotions and feelings (eg, joy, happiness)—optimism is conceptually distinct and measures an individual’s positive perception and expectations.

We investigated the independent association between optimism and stroke after adjusting for a wide range of risk factors and potential psychological confounds. To address concerns that a significant association between optimism and stroke is attributable to the absence of negative psychological factors, we sequentially (and simultaneously) analyzed anxiety, cynical hostility, depression, negative affect, neuroticism, and pessimism as covariates. We also addressed the possibility that optimism merely reflected the operation of a positive affect—which has been linked with reduced stroke9—by controlling for if in our analyses.

Study Population

The Health and Retirement Study (HRS) is a nationally representative and prospective panel study that surveys $\geq$ 22 000 Americans aged $\geq$ 50 years every 2 years.8 Data have been collected since 1992. We report on psychological and covariate data collected in the eighth wave (2006) along with occurrences of stroke collected in the ninth wave and during exit interviews (2008). For respondents who had died, exit interviews were completed by knowledgeable informants. The University of Michigan’s Institute for Social Research is responsible for the study and provides extensive documentation about the protocol, instrumentation, sampling strategy, and statistical weighting procedures.9

In 2006, approximately 50% of HRS respondents were visited for an enhanced face-to-face interview. These respondents received a self-report psychosocial questionnaire that they completed and mailed to the University of Michigan. The response rate was 90%. A total of 6882 individuals were eligible for HRS at baseline. Based on
incidence has been well documented. Studies find substantial agreement between self-reported strokes and hospital records. A previous study using HRS data confirmed that self-reported stroke is suitable for studying stroke and risk factors.

Dispositional Optimism Measurement
Optimism and pessimism were assessed separately using the modified Life Orientation Test–Revised. The 6-item Life Orientation Test–Revised without filler items was used; 3 items assess optimism, whereas the other 3 items assess pessimism. Studies using this modified Life Orientation Test–Revised have shown sufficient validity and reliability. Respondents were asked to rate each item on a 6-point Likert scale indicating the degree to which they endorsed such items as “In uncertain times, I usually expect the best.” Only 3 optimism items were summed, resulting in scores that ranged from 3 to 18, with higher scores reflecting higher optimism (Cronbach’s alpha = 0.81).

Covariates Measurement
Potential confounds of the association between optimism and stroke included chronic illness, self-rated health, sociodemographic, behavioral, biological, and psychological factors relevant to stroke risk factors. For chronic illness, self-report of a doctor’s diagnosis of 5 major medical conditions were recorded at baseline: high blood pressure, cancer, lung disease, psychiatric problems, and arthritis. The total number of conditions was used as an index of chronic illness. Short Form 36 was used as the self-rated health measure. The components of Short Form 36 were constructed by replicating a past study that created Short Form 36 using HRS data. Because our secondary analyses included depression as a covariate, depression items were excluded from Short Form 36. Sociodemographic variables included self-reported age, gender, race/ethnicity (white, black, Hispanic, other), which was dummy-coded with white as the reference group, marital status (married/not married), and educational attainment (no degree, GED or high school diploma, college degree or higher).

Behavioral covariates included current smoking status (yes/no), level of physical activity (low: hardly ever or never, moderate: 1 to 3 times a month or once a week, high: more than once a week or everyday), and alcohol use (yes/no).

Biological covariates included body mass index (weight/height² [kg/m²]): <18.5 [underweight], 18.5 to 24.9 [normal], 25 to 29.9 [overweight], ≥30 [obese], systolic and diastolic blood pressure (average of 3 measurements on the sitting respondents left arm, 45 seconds apart), hypertension, diabetes, and heart disease (yes/no based on self-report of a doctor’s diagnosis).

Psychological covariates included positive affect, anxiety, cynical hostility, depression, negative affect, neuroticism, and pessimism. Further information about the psychological measures can be found in the HRS Psychosocial manual. All means, SDs, and internal reliabilities of psychological measures are presented in Table 2.
Statistical Analyses
We conducted logistic regression to test whether optimism was associated with stroke. We considered the correlations among all psychological predictor variables; they raised no concerns about multicollinearity. To address the possibility that levels of optimism simply reflected chronic illnesses or self-rated health, we adjusted for both in all the models.

Given the large number of potential covariates and to avoid overfitting the logistic regression models,17 we examined the impact of the risk factors by creating a core model and then considered the impact of sets of related covariates in turn (compare with Kuzbansky, 2007)18: Model 1, core model (age, gender, chronic illness, self-rated health); Model 2, core model + additional sociodemographics (race/ethnicity, marital status, educational degree); Model 3, core model + health behaviors (current smoker, exercise, alcohol use); Model 4, core model + metabolic factors (diabetes, body mass index); and Model 5, core model + cardiovascular factors (systolic/diastolic blood pressure, hypertension, heart disease). Secondary analyses were performed to examine if the effects of optimism were founded by other psychological factors. To test this possibility, we created Model 6, which included (age, gender, chronic illness, self-rated health, race/ethnicity, marital status, educational degree) and ran the model separately with each psychological covariate.

Logits were converted into ORs for ease of interpretation. Because probability of stroke was rare in our sample (1.5%), our reported ORs can roughly be interpreted as relative risk, which presents a more intuitive interpretation for most readers.17 All models were weighted using HRS sampling weights to account for the complex multistage probability survey design, which includes individual nonresponse, sample clustering, stratification, and further poststratification using Stata (Release 11; StataCorp LP, College Station, TX).

Missing Data Analysis
To examine the impact of missing data on our results, we used the Imputation by Chained Equations technique as well as a Markov Chain Monte Carlo method and reran all analyses. We chose this technique because compared with simpler techniques, multiple imputation techniques have been shown to provide more accurate estimates of associations in a data set.19,20 Estimates of regression models were multiple imputation estimates derived using the combining rules defined by Little and Rubin.21 Where appropriate, design-based analyses of subpopulations—all eligible respondents—were applied to each of the 10 imputed data sets.21 Imputation by Chained Equations software in the Stata statistical analysis package was used.22 A missing at random mechanism for the missing values was assumed, and accordingly, an inclusive as opposed to restrictive use of auxiliary items for each variable with missing data was used.19,20 We then compared the results using the original data set for all final analyses.

Results

Optimism and Stroke
Over a 2-year follow-up, there were 88 cases of stroke incidence. After controlling for age, gender, chronic illness, and self-rated health (Model 1), each unit increase in optimism was associated with a multivariate adjusted OR of 0.91 for stroke (95% CI, 0.85 to 0.98; P<0.01). The association between optimism and stroke remained significant in all 5 models regardless of which covariates were included (Table 3). Although doing so overfits the model,17 including all covariates in a model resulted in a multivariate-adjusted OR of 0.89 for stroke (95% CI, 0.83 to 0.97; P<0.01). We did not find any interaction effects with age, gender, chronic illness, self-rated health, race/ethnicity, marital status, or education.

Psychological Covariates
To examine if the association between optimism and stroke was attributable to the absence of negative psychological factors, we conducted secondary analyses. A base model was created including stroke, optimism, age, gender, chronic illness, self-rated health, race/ethnicity, marital status, education, and 1 negative psychological factor. We first examined the correlations between optimism and the negative psychological factors. Correlations were −0.22 (anxiety), −0.08 (cynical hostility), −0.21 (depression), −0.28 (negative affect), −0.28 (neuroticism), and −0.23 ( pessimism). We then tested whether each of the negative psychological factors was independently associated with stroke. Analyses indicated that anxiety (OR, 2.12; 95% CI, 1.31 to 3.45; P<0.01), depression (OR, 1.20; 95% CI, 1.06 to 1.34; P<0.01), negative affect (OR, 1.69; 95% CI, 1.23 to 2.33; P<0.01), and neuroticism (OR, 1.28; 95% CI, 1.01 to 1.26; P<0.05) were significantly associated with stroke, whereas cynical hostility and pessimism were not. We then separately examined the impact of each negative psychological factor within the base model—Model 6. Each negative psychological factor caused only a modest decrease in the association between optimism and stroke. Finally, all negative psychological factors were added simultaneously to Model 6. The protective effect of optimism remained significant in all models, implying that optimism protects against stroke above and beyond the effects of the negative psychological factors tested.

To further test if the association between optimism and stroke reflected the operation of a positive affect, another psychological factor linked with reduced incidence of stroke,9 we reran the same procedure already described. The correlation between optimism and positive affect was 0.36. We examined whether positive affect was independently associated with stroke, and it was not (P=0.249). When positive affect was added as a covariate, the effect of optimism remained significantly associated with stroke (OR, 0.92; 95% CI, 0.86 to 0.98; P<0.05), implying that optimism protects against stroke above and beyond the effects of a positive affect.

Discussion

Dispositional optimism was associated with a reduced risk of stroke in a prospective and nationally representative sample of American adults, aged ≥50 years, who were stroke-free at baseline. This association persisted even after adjusting for potential sociodemographic, behavioral, biological, and psychological factors. On an optimism measure ranging from 3 to 18, each unit increase in optimism was associated with a 9% reduced risk of stroke over a 2-year follow-up even after controlling for potential risk factors. The current findings further suggest that the effect of optimism on stroke is not attributable to other known psychological risk factors for cardiovascular illness such as anxiety, hostility, depression, neuroticism, pessimism, and a low positive affect.

Although our follow-up period was only 2 years, which is relatively short compared with other similar studies, our study...
addressed the recent call by a National, Heart, Lung, and Blood Institute working group. The group called for the discovery of factors that identify patients who are at near-future risk for cardiovascular events. Due to optimism’s unique ability to predict stroke, optimism may serve as a variable that can be added into near-future stroke-risk algorithms that are specifically tailored for older adults. Optimism may protect against stroke through different pathways, including health behaviors. People who have high optimism may engage in a healthy lifestyle that minimizes health risks and increases health and well-being. Perhaps, when people have a positive outlook on life, they undertake actions more likely to produce good outcomes. For example, higher optimism in a cardiac rehabilitation program predicted increased exercise and successful lowering of body fat, saturated fat, and an index of overall coronary risk. More studies are needed to further understand the mechanisms that facilitate the protective role of optimism on stroke.

Our findings are largely consistent with previous studies that have reported a positive relationship between optimism and cardiovascular health. The present results, however, are inconsistent with 1 study’s findings, which reported an association between low pessimism and reduced risk of stroke but no link between high optimism and stroke. The inconsistency between their results and the current study’s results may be attributable to differences in study design such as the age of the samples, length of follow-up, and/or method of data analysis. The previous study used younger Finnish adults (all aged <54 years), and the current study was conducted with older American adults. Perhaps the psychosocial predictors of stroke vary as a function of age. Research has found that older adults possess lower levels of optimism compared with younger adults. Thus, optimism may matter more for stroke among older adults. Furthermore, optimism may operate differently in predicting stroke in a long-term versus short-term follow-up (eg, 7-year follow-up in the

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<th>Table 3. Logistic Regressions of Optimism and Stroke Incidence</th>
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BMI indicates body mass index; BP, blood pressure. *P<0.05.
previous study versus 2-year follow-up in the current study). Finally, the previous study used a method of creating discrete groups based on optimism and pessimism scores, whereas the current study analyzed optimism and pessimism scores as ordinal variables. Further studies are needed to clarify the association between optimism and stroke with different age groups, in shorter-term and longer-term follow-ups, and with different data analysis strategies.

The current study may be limited in that the stroke outcome measure was based on self-report. Self-report of a doctor’s diagnosis or proxy reports for respondents who died, however, have been shown to provide accurate estimates of stroke occurrence.11–13 The present study is significant because it is among the first to examine the relationship between optimism and stroke among older adults in a prospective study with a large and nationally representative sample. Strengths of the current study also include analyzing a large number of potential covariates that further clarified the main findings.

Stroke imposes an immense psychological, social, and financial burden on individuals, families, and society. More longitudinal studies are necessary to examine when, why, and how optimism plays a protective role against stroke. Twin studies estimate that only a portion of the variance in optimism is genetically influenced,26 suggesting the malleable nature of optimism. If further research corroborates our findings, trial studies using optimism interventions to supplement current stroke protocol may be warranted.

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Disclosures
None.

References
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