Finding the Glass Half Full? Optimism is Protective of 10-year Incident CHD in a Population-based Study: *The Canadian Nova Scotia Health Survey*

Jonathan D Hansen, BS[1], **Daichi Shimbo, MD**[1], **Jonathan A. Shaffer, PhD**[1], **Sangbeen Hong, BA**[1], **Tomas Borda, MD**[1], **Albania Ventura, MD**[1], **Joseph E Schwartz, PhD**[1], **Manjunath Harlapur, MD**[1], and **Karina W. Davidson, PhD**[1]

[1] Department of Medicine, Columbia University Medical Center, New York, NY

While some convenience studies have found that optimism is protective for the risk of incident coronary heart disease (CHD) events, others have not. Optimism is separate from, but related to positive affect. We examined whether optimism was associated with a lower long-term risk of coronary heart disease (CHD) events in a large, population-based sample, independent of positive affect with 10 years follow-up after adjusting for positive affect.

We examined whether optimism reduces the risk of incident CHD defined as fatal or nonfatal ischemic heart disease determined by hospital discharge codes or death certificates using ICD-9 codes (410–414) and ICD-10 codes (I21–I25). The population-based sample included the 1,739 adults (862 men and 877 women) in the 1995 Nova Scotia Health Survey. The study assessed optimism independent of Framingham cardiovascular risk factors, depressive symptoms, hostility, anxiety and positive affect; the latter assessed by the Center for Epidemiological Studies Depression Scale, Cook Medley Hostility scale, Spielberger Trait Anxiety Inventory, and objectively rated positive affect, respectively. Optimism was assessed using two questions from the revised Life Optimism Test questionnaire (LOT-R).

There were 145 (8.3%) acute non-fatal or fatal ischemic heart disease events during the 14,916 person-years of observation. In a proportional hazards model controlling for age, sex, traditional cardiovascular risk factors and all the affect scales, those with moderate levels of optimism had reduced risk of incident CHD compared to those with high or low optimism levels (adjusted HR, 0.58; 95% CI 0.34–0.99; P=.047).

In this large, population-based study, only moderate levels of optimism were associated with lower 10-year risk of incident CHD, independent of positive and negative affect.

We recently published that positive affect was independently associated with decreased risk of 10-year incident coronary heart disease (CHD) in a large, population-based sample Questions arose about whether this reduction in risk was related to the experience of positive affect, or was due to an optimistic predisposition. We report here on whether or not

Corresponding Author: Karina W. Davidson, Center for Behavioral Cardiovascular Health, 622 West 168th St, PH9 Room 948, Columbia University Medical Center, New York, New York, 10032, kd2124@columbia.edu, Work: 212-342-4493; Fax: 212-342-3431.

optimism is related to decreased risk of incident coronary heart disease (CHD) events, independent of positive affect.

Details on this randomly selected, population-based, Canadian sample are reported in previously published reports Briefly, The Canadian Nova Scotia Health study is a population-based survey with a probability sample representative of the Nova Scotian population by age, gender and geographic location. A group of 29 trained public health nurses collected the data using standardized measures. Participants were at least 18 years old with no known CHD at baseline and completed the survey, clinic exam and structured interview (see Table 1).

At the baseline visit, we measured the levels of each Framingham risk score, including sex, age, total cholesterol, HDL cholesterol, blood pressure, history of diabetes, and cigarette smoking

Three negative affect measures and one positive affect measure were included as covariates to test if optimism was independently predictive of incident CHD. **Depressive symptoms** were measured using the Centers for Epidemiological Studies-Depression symptoms (CES-D) scale; **Hostility** was assessed with both the Cook-Medley Hostility scale, **Anxious symptoms** were assessed with the trait-subscale of the Spielberger Trait Anxiety scale. Twenty-three certified coders scored videotaped interviews for **Positive Affect**, from 1 (no positive affect expressed) to 5 (extreme positive affect). **Optimism**, the stable predisposition to have positive expectancies about the future, was assessed by a shortened Life Optimism Test questionnaire (LOT-R) [10]. Optimism was scored using a 1 (strongly disagree) to 5 (strongly agree) scale for two specific questions: (1) Are you always optimistic about your future? and (2) Do you rarely expect things to go your way? (reverse scored). Scores could range from 2–10, higher scores indicating higher levels of optimism. Three optimism groups were formed: High Optimism level, which was endorsed by 62% (n=1090) who 'agreed' or 'strongly agreed' with both optimistic statements on average. The Moderate Optimism group (16%; n=269) who responded they were 'neutral' with both optimistic statements on average. Finally, the Low Optimism group (22% n=380) who 'disagreed' or 'strongly disagreed' on average with both statements.

The outcome variable was incident fatal or nonfatal ischemic heart disease determined by hospital discharge codes or death certificates (International Classification of Diseases, ICD-9 codes (410–414) and ICD-10 codes (I21–I25)). Deaths with the same codes as above were included as events.

This prospective study included 1739 participants (862 men, 877 women) from the Nova Scotia Health Survey. There were 145 (8.3%) incident CHD events (136 nonfatal, 9 fatal) during the 14,916 person-years of observation (incidence rate, 9.72 events/1000 person-years).

In a Cox regression analysis that adjusted for age, sex, Framingham cardiovascular risk factors, negative and positive affect, the Moderate optimism grouping was associated with a reduced risk of 10-year incident CHD, compared to Low and High Optimism groups (adjusted HR, 0.58; 95% CI 0.34–0.99; P=0.047). There were no other significant differences among the three Optimism groups.

In this large, randomly selected population-based study, a moderate level of optimism was associated with a reduced risk of 10-year incident CHD independent of Framingham cardiovascular risk factors, depression, hostility, anxiety and positive affect. This is the first study to control for positive affect and examine the association of optimism and incident CHD in a large, generalizable, prospective population sample.

Cardiovascular risk factors and psychosocial variables were measured at baseline and it is likely that during the ten year follow-up participants might have experienced changes in cardiovascular risk factors, health behaviors, affect, and medications. Similarly, levels of optimism were only measured at baseline.

Because this is an observational study, we cannot rule out the possibility of unmeasured or residual confounding. We did control for many covariates, but other unmeasured confounds could remain. Therefore, confirmatory studies are needed. Strengths of our analysis include: the relatively large sample size, long-term follow-up, and inclusion of standard negative affect measures and positive affect measures as covariates.

In summary, in this prospective population-based study, we found that *moderate,* but not high or low optimism levels were associated with a reduced risk of CHD, independent of positive affect. Future studies can test if 'finding the glass half full' has cardioprotective effects.

Acknowledgments

Table 1

Baseline Characteristics of Population-based, Coronary Heart Disease (CHD)-free, Men and Women Aged 18–98 Years: Continuous Variables reported as mean ± standard deviation and categorical variables reported as number (percent of sample) (N=1,739)

Variable	Mean (Standard Deviation) OR N (%)
Age	46.2±18.0
Male	862 (49.6%)
Active Smoking	451 (25.9%)
Body Mass Index, kg/m^2	27.1±5.6
Diabetes Mellitus	65 (3.7%)
Total Cholesterol, mmol/L	5.3±1.1
Low Density Lipids, mmol/L	3.2±0.9
Systolic Blood Pressure, mmHg	124.7±17.0
Diastolic Blood Pressure, mmHg	77.0±9.7
Depressive Symptoms[A]	7.4±8.1
Hostility[B]	19.0±8.1
Anxiety[C]	36.6±8.4
Positive Affect[D]	2.5±0.9
Optimism[E]	7.6±1.5

[A] CES-D scale;

[B] Cook-Medley Hostility scale;

[C] Trait subscale of State /Trait Anxiety scale;

[D] Videotaped interview score of 23 certified coders;

[E] Life Optimism Test questions