Association between visual impairment and psychiatric symptoms in older adults

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BACKGROUND

- Vision impairment (VI) and mental health conditions are:
  - ✓ highly prevalent among older adults
  - ✓ major causes of morbidity and healthcare expenditures
- There are few nationally-representative studies on the longitudinal association between VI and depressive symptoms, and no such data on anxiety symptoms.
- Similar studies in other settings have evidence of a bidirectional relationship between vision and mental health; others have found no relationship at all.

PURPOSE

To evaluate the longitudinal association and the directionality of the relationship between self-reported VI and clinically-significant symptoms of depression and anxiety in older Americans.

METHODS

Study Sample:
- Data from Round 1 (2011) through Round 6 (2016) of the National Health and Aging Trends Study (NHATS) public-use datasets.
- NHATS is a nationally representative panel study of Medicare beneficiaries aged 65 and older.
- Participants with missing data on VI status at baseline (n=25) were excluded
- Final analytical sample consisted of 7,584 Medicare beneficiaries aged 65 or over.

Outcome Measures:
- Vision Impairment (VI), defined as:
  - ✓ Blind, and/or
  - ✓ Could not see across the street, and/or
  - ✓ Could not read newspaper print
- Significant depressive symptoms (PHQ-2 score of 3 or higher)
- Significant anxiety symptoms (GAD-2 score of 3 or higher)

Covariates:
- Socio-demographics: age, sex, race/ethnicity, financial status and highest education
- Survey design factors: proxy respondent and survey round

Analysis:
- Baseline sample characteristics were stratified by VI status and bivariate comparisons were examined using Pearson chi-squared tests for categorical variables and t-tests for continuous variables.
- Multivariable Cox regression to model the relationship between baseline VI or mental health symptoms and future outcomes
- For sensitivity analysis, we reran the Cox models after pairwise deletion of all data provided by proxies.

RESULTS

Sample Characteristics

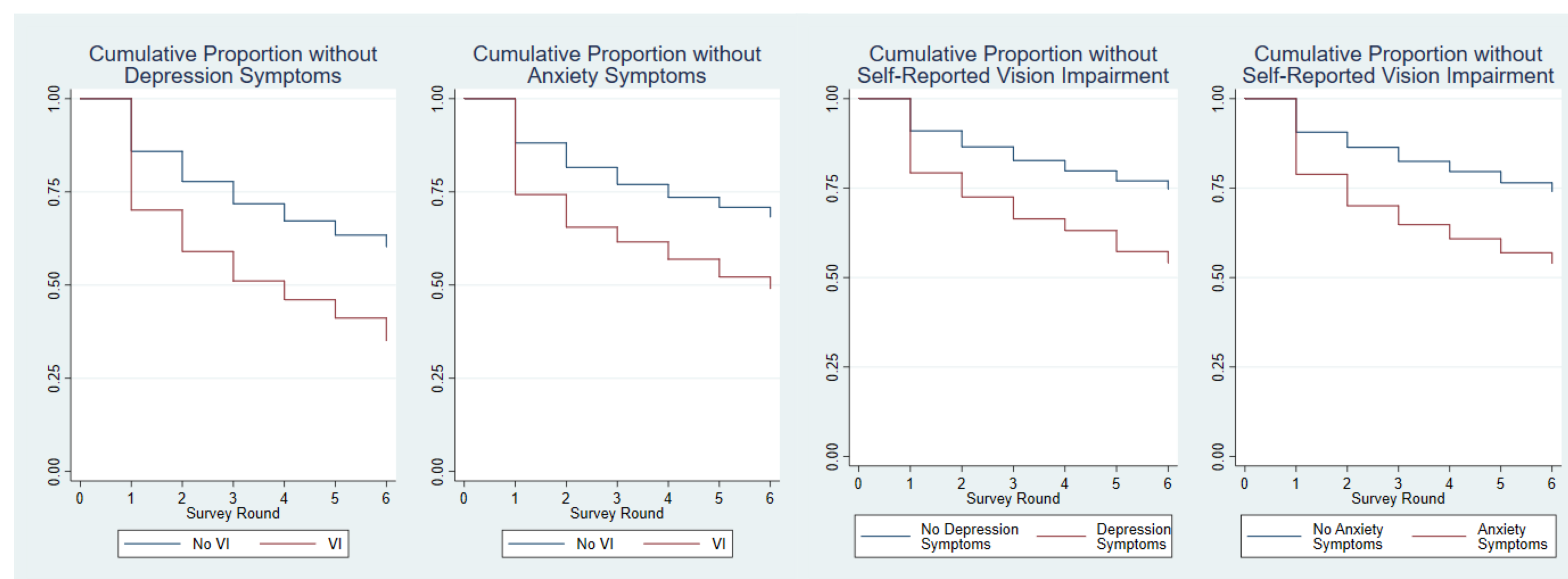| Sociodemographics	Without vision impairment [95% CI] (n=6,744)	With vision impairment [95% CI] (n=840)
Age groups (%)***		
65-69 years	28.7 [27.7-29.8]	20.7 [17.6-24.1]
70-74 years	26.0 [25.1-26.9]	14.6 [11.3-18.7]
75-79 years	19.3 [18.5-20.1]	17.0 [14.0-20.5]
80-84 years	14.4 [13.7-15.2]	16.8 [14.1-19.9]
85-89 years	8.3 [7.6-8.9]	18.0 [15.4-20.9]
90 years or over	3.3 [2.9-3.8]	13.0 [11.1-15.2]
Sex (%)***		
Female	55.7 [54.1-57.2]	65.5 [61.8-69.1]
Male	44.3 [42.8-45.9]	34.5 [30.1-38.2]
Race/ethnicity (%)***		
White, Non-Hispanic	81.3 [79.6-82.9]	72.1 [67.2-76.5]
Black, Non-Hispanic	7.9 [7.1-8.7]	10.9 [9.3-12.7]
Hispanic	6.2 [5.3-7.3]	12.2 [8.5-17.1]
Other	4.6 [3.7-5.8]	4.9 [3.3-7.4]
Education (%)***		
Less than high school	20.2 [18.5-21.9]	38.5 [33.9-43.2]
High school	27.6 [26.2-29.0]	27.4 [24.0-30.1]
Some college	21.8 [20.5-23.1]	18.1 [14.6-22.2]
College graduate	30.5 [28.2-33.0]	16.1 [13.0-19.8]
Dementia status (%)***		
No dementia	81.7 [80.0-83.2]	53.6 [48.7-58.5]
Possible dementia	10.58 [9.4-11.9]	14.7 [11.9-18.0]
Probable dementia	7.8 [7.0-8.6]	31.65 [27.9-35.7]
Medicare-Medicaid enrollees (%)***	10.7 [9.5-12.0]	25.0 [21.0-29.3]
Number comorbid conditions (mean)***	2.32 [2.28-2.36]	3.03 [2.88-3.17]
Proxy respondent (%)***	4.0 [3.5-4.7]	22.3 [18.7-26.3]

***p-value <.001

Cox Regression Models

Predictors	Mental Health Outcomes		Predictors	Depression Symptoms Model	Anxiety Symptoms Model
	Depression Symptoms aHR (95% CI)	Anxiety Symptoms aHR (95% CI)		Vision Impairment aHR (95% CI)	Vision Impairment aHR (95% CI)
No Vision Impairment	Reference	Reference	No MH Symptoms	Reference	Reference
Vision Impairment	1.33 (1.15, 1.55)	1.06 (0.85, 1.31)	MH Symptoms	1.37 (1.08, 1.75)	1.55 (1.19, 2.02)
Age			Age		
65-69	Reference	Reference	65-69	Reference	Reference
70-74	0.98 (0.75, 1.29)	1.16 (0.80, 1.70)	70-74	1.13 (0.72, 1.78)	1.12 (0.71, 1.77)
75-79	1.19 (0.93, 1.52)	1.25 (0.86, 1.83)	75-79	1.40 (0.94, 2.10)	1.38 (0.93, 2.06)
80-84	1.29 (1.00, 1.67)	1.18 (0.83, 1.67)	80-84	1.73 (1.18, 2.52)	1.71 (1.17, 2.51)
85-89	1.18 (0.90, 1.54)	1.41 (0.98, 2.04)	85-89	1.98 (1.38, 2.84)	1.99 (1.41, 2.79)
90+	1.30 (0.97, 1.73)	1.26 (0.87, 1.80)	90+	2.32 (1.59, 3.37)	2.26 (1.55, 3.28)
Sex			Sex		
Female	Reference	Reference	Female	Reference	Reference
Male	1.09 (0.96, 1.24)	0.75 (0.63, 0.90)	Male	0.96 (0.83, 1.12)	0.96 (0.82, 1.12)
Race/Ethnicity			Race/Ethnicity		
White	Reference	Reference	White	Reference	Reference
Black	1.30 (1.12, 1.52)	1.06 (0.88, 1.31)	Black	1.38 (1.18, 1.62)	1.41 (1.19, 1.66)
Hispanic	1.24 (0.96, 1.60)	1.46 (1.04, 2.04)	Hispanic	2.00 (1.56, 2.54)	1.99 (1.56, 2.54)
Other	1.34 (1.01, 1.78)	1.00 (0.67, 1.48)	Other	1.72 (1.12, 2.62)	1.77 (1.16, 2.68)
Education			Education		
No degree	Reference	Reference	No degree	Reference	Reference
HS degree	0.89 (0.73, 1.08)	0.90 (0.75, 1.08)	HS degree	0.76 (0.59, 0.97)	0.77 (0.60, 0.98)
Some college	0.75 (0.61, 0.91)	0.85 (0.69, 1.05)	Some college	0.88 (0.70, 1.10)	0.89 (0.71, 1.11)
College degree	0.58 (0.47, 0.71)	0.61 (0.49, 0.77)	College degree	0.66 (0.52, 0.85)	0.67 (0.52, 0.85)
Medicare-Medicaid enrollees	1.59 (1.32, 1.92)	1.43 (1.16, 1.77)	Medicare-Medicaid enrollees	1.17 (0.96, 1.43)	1.15 (0.94, 1.41)
Dementia status			Dementia status		
No dementia	Reference	Reference	No dementia	Reference	Reference
Possible dementia	1.34 (1.14, 1.59)	1.51 (1.18, 1.94)	Possible dementia	1.27 (1.02, 1.59)	1.29 (1.01, 1.63)
Probable dementia	1.80 (1.54, 2.10)	2.25 (1.82, 2.79)	Probable dementia	1.97 (1.61, 2.42)	1.92 (1.54, 2.39)
Chronic disease count	1.24 (1.18, 1.29)	1.21 (1.14, 1.28)	Chronic disease count	1.13 (1.08, 1.18)	1.12 (1.07, 1.17)
Proxy respondent	1.78 (1.48, 2.15)	1.39 (1.09, 1.77)	Proxy respondent	**2.55 (2.05, 3.18)**	2.65 (2.15, 3.27)

MH: mental health

Kaplan-Meier Curves

Cumulative Proportion without Depression Symptoms — No VI / VI

Cumulative Proportion without Anxiety Symptoms — No VI / VI

Cumulative Proportion without Self-Reported Vision Impairment — No Depression Symptoms / Depression Symptoms

Cumulative Proportion without Self-Reported Vision Impairment — No Anxiety Symptoms / Anxiety Symptoms

DISCUSSION

Cross-sectional association
- Weighted prevalence of depression and anxiety symptoms were more than twice as high among participants with self-reported VI compared with those who did not report VI.
- More likely to report VI at baseline if: older, female, non-white, less educated, dual-eligible for Medicaid, more medical comorbidities, or proxy respondent (p<0.001 for all comparisons).

Longitudinal Relationship
- Those with self-reported VI at baseline had an increased hazard of future clinically-significant symptoms of depression (HR=1.33, 95% CI 1.15-1.55) but not anxiety (HR=1.06, 95% CI 0.85-1.31).
- Symptoms of depression (HR=1.37, 95% CI 1.08-1.75) and anxiety (HR=1.55, 95% CI 1.19-2.02) at baseline associated with increased hazard of reporting VI in the future.

Sensitivity Analysis
- Cox models re-estimated after excluding all data provided by proxy respondents
- Effect size and directionality was similar to the models that included proxy data.

Conclusions
- **We found a significant longitudinal relationship between VI and symptoms of depression and anxiety.**
- **There is a bidirectional relationship between depression and anxiety, and baseline anxiety is associated with future VI.**

Implications
- Eye care providers should recognize that VI is associated with increased mental disease burden and provide necessary support to patients
- Vision rehabilitation programs should include mental health resources to enhance the quality of life and overall health of older people with vision impairment

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