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The Association of Health-Related Quality of Life with Severity of Visual Impairment among People Aged 40–64 Years: Findings from the 2006–2010 Behavioral Risk Factor Surveillance System

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Abstract

Purpose—To examine the association of health-related quality of life (HRQoL) with severity of visual impairment among people aged 40–64 years.

Methods—We used cross-sectional data from the 2006–2010 Behavioral Risk Factor Surveillance System to examine six measures of HRQoL: self-reported health, physically unhealthy days, mentally unhealthy days, activity limitation days, life satisfaction, and disability. Visual impairment was categorized as no, a little, or moderate/severe. We examined the association between visual impairment and HRQoL using logistic regression accounting for the survey's complex design.

Results—Overall, 23.0% of the participants reported a little difficult seeing, while 16.8% reported moderate/severe difficulty seeing. People aged 40–64 years with moderate/severe visual impairment had more frequent (≥14) physically unhealthy days, mentally unhealthy days, and activity limitation days in the last 30 days, as well as greater life dissatisfaction, greater disability, and poorer health compared to people reporting no or a little visual impairment. After controlling for covariates (age, sex, marital status, race/ethnicity, education, income, state, year, health insurance, heart disease, stroke, heart attack, body mass index, leisure-time activity, smoking, and medical care costs), and compared to people with no visual impairment, those with moderate/severe visual impairment were more likely to have fair/poor health (odds ratio, OR, 2.01, 95% confidence interval, CI, 1.82–2.23), life dissatisfaction (OR 2.06, 95% CI 1.80–2.35), disability (OR 1.95, 95% CI 1.80–2.13), and frequent physically unhealthy days (OR 1.69, 95% CI 1.52–

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the writing and content of this article.

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1.88), mentally unhealthy days (OR 1.84, 95% CI 1.66–2.05), and activity limitation days (OR 1.94, 95% CI 1.71–2.20; all $p < 0.0001$).

Conclusion—Poor HRQoL was strongly associated with moderate/severe visual impairment among people aged 40–64 years.

Keywords

Behavioral Risk Factor Surveillance System (BRFSS); health-related quality of life; middle age; visual impairment; working age

Introduction

A number of investigations have demonstrated that people with visual impairment report poorer quality of life than those without visual impairment.[1,2] Quality of life instruments employed in vision research vary from broad assessments of wellbeing to vision-specific measures of an individual's ability to perform various tasks.[3] The Centers for Disease Prevention and Control (CDC) Behavioral Risk Factors Surveillance System (BRFSS) provides a set of questions to measure respondents' self-reported health, number of days physical health was not good, number of days mental health was not good, number of days that mental or physical health limited usual activities (self-care, work, and recreation), life satisfaction, and disability. These health-related quality of life (HRQoL) measures are designed to track physical and mental health over time, identify unmet health needs, and guide community health efforts to improve population health.[4]

In this study, we examined HRQoL among people aged 40–64 years reporting no, a little, and moderate/severe visual impairment. This age cohort represents adults in their most economically productive years; consequently, identifying disparities in HRQoL may inform health and public health interventions to improve health and productivity in this age group.[5–9]

Materials and methods

We used data from the 2006–2010 Behavioral Risk Factor Surveillance System, a state-based, random-digit-dialed telephone survey of the non-institutionalized civilian population aged ≥18 years in the United States. The BRFSS data are de-identified and publicly available. The CDC Institutional Review Board reviewed and approved the BRFSS protocol. Details on survey methods, questionnaires, data, and relevant reports appear at http://www.cdc.gov/brfss. The BRFSS questionnaire consists of four sections: (1) Core questions asked in all 50 states and the District of Columbia each year; (2) a rotating set of core questions asked in alternate years in all 50 states and the District of Columbia; (3) supplemental modules, which are specific sets of questions asked in some states; and (4) state-added questions. The core questionnaire contains six HRQoL measures. An optional nine-question Visual Impairment and Access to Eye Care supplemental module (Vision Module) was implemented between 2005 and 2010 in about half of the states. The BRFSS surveys people aged ≥18 years; however, the Vision Module is employed only among those

aged ≥40 years in the surveys after 2006 and those aged ≥50 years in the surveys prior to 2005.

For this study, we analyzed responses from 101,079 adults aged 40–64 years in the 22 states (Alabama, Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Maryland, Massachusetts, Missouri, Nebraska, New Mexico, New York, North Carolina, Ohio, Tennessee, Texas, West Virginia, and Wyoming) that used the Vision Module at least once during the 2006–2010 BRFSS surveys. Sample sizes varied by state, ranging from 13,691 people in Alabama to 1812 in Arkansas. Annual median state response rates, the percentages of persons who completed the BRFSS interview among all eligible persons in these states during that period, ranged from 50.6% to 54.6%; median state cooperation rates, the percentages of persons who completed the interview among all eligible persons who were contacted, ranged from 75.2% to 79.7%.

Health-related quality of life

Consistent with previous investigations, we measured HRQoL in six areas; life satisfaction, disability, self-rated health, physically unhealthy days, mentally unhealthy days, and activity limitation days.[10] These questions have demonstrated validity and reliability for population health surveillance,[11,12] and predict health care use, morbidity, and mortality.[13] The CDC HRQoL measures have been compared to the 36-item short form health survey (SF-36) to assess their construct, criterion, and known groups validity and found to be acceptable.[14] Another article has described how the CDC HRQoL measures were developed, evaluated, and validated in other contexts.[15] A third article studied the retest reliability of the CDC HRQoL measures.[16] A bibliography citing other studies on the validity and reliability of the CDC HRQoL measures is located at http://www.cdc.gov/hrqol/pubs/measurement/validity.htm.

We dichotomized the responses to the life satisfaction question, “In general, how satisfied are you with your life?” into satisfied (including very satisfied and satisfied) and dissatisfied (including dissatisfied and very dissatisfied). We defined disability by responses to two questions, “Are you limited in any way in any activities because of physical, mental, or emotional problems?” and “Do you now have any health problem that requires you to use special equipment, such as a cane, a wheelchair, a special bed, or a special telephone?” and classified those responding “yes” to either question as having a disability. We dichotomized responses to the self-rated health question into fair/poor health and good/very good/excellent health. Three questions asked about self-assessed health referencing the previous 30 days, “Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?”, “Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?”, and “During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?”. Responses to these questions were dichotomized into <14 days (infrequent) and ≥14 (frequent) unhealthy days in each domain. This dichotomized approach has been used consistently in multiple investigations of these HRQoL measures.[14,15]

Visual impairment

We assessed self-reported visual impairment by using two questions from the Vision Module; “Regardless of whether or not you currently wear glasses or contact lenses, how much difficulty, if any, do you have in recognizing a friend across the street?” and “How much difficulty, if any, do you have reading print in newspapers, magazines, recipes, menus, or numbers on the telephone?”. Response categories were “no difficulty,” “a little difficulty,” “moderate difficulty,” “extreme difficulty,” “unable to do because of eyesight,” and “unable to do because of other reasons.” We defined no visual impairment as a response of no difficulty to both the distance (recognize a friend across the street) and the near (read newspaper print) questions; we defined a little visual impairment as a response of “a little difficulty” to either question; and we defined moderate/severe visual impairment as a response of “moderate difficulty,” “extreme difficulty,” or “unable to do because of eyesight” to either question. “Moderate difficulty,” “extreme difficulty” and “unable to do” were collapsed into one category “moderate/severe difficulty.” A response of “unable to do because of other reasons” was omitted from the analyses.

Other covariates

Based on previous studies,[16,17] we included several possible confounders in our multivariate models. These covariates were age (40–54 years, 55–64 years), sex, marital status, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), education (<high school, high school or equivalent, or >high school), annual household income (<$35,000 or ≥$35,000), smoking status (current, former, and never),[17,18] leisure-time physical activity (yes or no to the question “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?”),[19,20] estimated body mass index (BMI, calculated from reported weight in kilograms divided by reported height in meters squared and categorized as normal/underweight, BMI <25 kg/m^2, overweight, BMI 25–<30 kg/m^2, and obese, BMI ≥30 kg/m^2),[21] having a regular healthcare provider (“Do you have one person you think of as your personal doctor or health care provider?”),[22] lack of medical care due to cost (“Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?”),[23] and self-reported history of chronic diseases (diabetes,[24] heart disease, heart attack,[25,26] and stroke[27]). To control for a possible temporal trend and differences across states, we also included variables for interview year and state of residence in the model.

Statistical analysis

We used chi-square statistics to test for differences in background characteristics and HRQoL among people by severity of self-reported visual impairment. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) from multiple logistic regression were used to assess the association between severity of visual impairment and each HRQoL outcome. All the models were based on analyzing the 101,979 respondents with complete information about visual impairment, HRQoL outcomes, and the potential confounders. We excluded 24,296 (19.24%) respondents due to missing information; income contributed the most missing values. We adjusted all analyses for the following potential confounders;

demographic variables (age, sex, marital status, race/ethnicity, education, and household income), chronic conditions (diabetes, heart disease, stroke, and heart attack), BMI, health behaviors (physical activity and smoking), access to care (regular health care provider, medical care cost as problem), year, insurance, and state of residence.

We analyzed these data using Stata version 12.0 (StataCorp LP, College Station, TX, USA) survey procedures (svy commands) to account for the complex sampling design of the BRFSS by weighting estimates for individual selection probabilities, nonresponse, and post-stratification. Regression analyses were performed using the svy: logistic command. Because some states used the Vision Module in more than 1 year during 2006 to 2010, we adjusted the state-specific respondent sampling weights to represent an average annual population for each state. This adjustment prevents over-representation of respondents in the model. We considered p-values ≤0.05 statistically significant.

Results

Among our study population, two-thirds (67.7%) were aged 40–54 years, 50.8% were female, 9.9% were non-Hispanic black, and 9.7% were Hispanic (Table 1). Overall, 23.0% of the study population reported a little difficulty seeing, while 16.8% reported moderate/severe difficulty seeing. A higher percentage of those reporting moderate/severe visual impairment compared to no visual impairment were female (55.6% vs 48.2%), unmarried (36.4% vs 25.3%), non-Hispanic black (11.9% vs 9.3%), Hispanic (13.5% vs 8.8%), those with less education (<high school, 15.6% vs 6.6%), those who were not working (40.7% vs 25.0%), and those with annual household incomes below $35,000 (44.3% vs 24.1%). Moderate/severe self-reported visual impairment compared to no visual impairment was consistently associated with greater prevalence of four comorbid chronic conditions (diabetes, heart disease, heart attack and stroke). Moreover, compared to those with no visual impairment, people with moderate/severe visual impairment reported more obesity and current smoking, and less leisure-time physical activity. They also reported less access to a regular health care provider, more medical care cost concerns, and less health insurance coverage.

Compared to those with no visual impairment, those with a little visual impairment reported a similar, though less pronounced, pattern to those with moderate/severe visual impairment. More younger persons, women, unmarried persons, non-Hispanic blacks, Hispanics, those with less education, and those with lower household income reported a little difficulty seeing. Those with a little visual impairment generally reported more chronic conditions, especially diabetes and stroke; however, those reporting a little visual impairment did not significantly differ from those with no visual impairment with respect to either heart disease or heart attack. While those with little visual impairment did not significantly differ from those with no difficulty seeing with respect to access to a regular health care provider, those with a little visual impairment reported greater medical care cost issues and less insurance coverage.

Across the six HRQoL measures, poorer outcomes were associated with increased severity of visual impairment (Table 2). For example, 3.7% of people with no visual impairment

reported life dissatisfaction compared to 13.3% of people with moderate/severe visual impairment. Similarly, 19.3% of people with no visual impairment reported a disability compared to 41.2% with moderate/severe visual impairment. In addition, 12.4% of those with no visual impairment reported fair/poor health compared to 33.0% of people with moderate/severe visual impairment. The prevalence of frequent physically unhealthy days, frequent mentally unhealthy days, and frequent activity limitation days increased with severity of visual impairment.

After controlling for potentially confounding variables in our model, severity of self-reported visual impairment was still associated with poorer HRQoL outcomes among the six measures we investigated (Table 3). Compared to people with no visual impairment, those with moderate/severe visual impairment reported significantly greater odds of fair/poor health (OR 2.01), life dissatisfaction (OR 2.06), and disability (OR 1.95). Those reporting moderate/severe visual impairment, compared to those with no visual impairment, reported greater odds of frequent physically unhealthy days (OR 1.69), frequent mentally unhealthy days (OR 1.84), and frequent activity limitation days (OR 1.94; all $p < 0.0001$). Those reporting a little visual impairment, likewise reported greater odds of fair/poor health (OR 1.45), life dissatisfaction (OR 1.35), and disability (OR 1.46) as well as greater odds of frequent physically unhealthy days (OR 1.33), frequent mentally unhealthy days (OR 1.35) and frequent activity limitation days (OR 1.38; all $p < 0.0001$).

Discussion

In this population-based survey of 22 US states, 16.8% of respondents aged 40–64 years reported moderate/severe visual impairment, and 23.0% reported a little visual impairment. Those with self-reported moderate/severe visual impairment were approximately twice as likely as people with no visual impairment to indicate poorer HRQoL across the six indicators employed in this study; fair/poor health, life dissatisfaction, disability, frequent physically unhealthy days, frequent mentally unhealthy days, and frequent activity limitation days. People aged 40–64 years reporting a little visual impairment were about 1.3–1.5 times as likely to report poorer HRQoL outcomes using these six measures.

These findings are consistent with other investigations that have employed other measures of quality of life to gauge the status of people with visual impairment and blindness,[5–8,31,32] or eye diseases.[28–37] Patterns of decreased quality of life are reported among those who are younger[38–40] as well as those over 65 years, although most studies have addressed older people. Elsewhere we have discussed the evolution of quality of life in vision research as well as the contribution of the CDC HRQoL measures to characterize health outcomes.[10]

In a population-based sample of Latinos aged 40 years and older in the Los Angeles Latino Eye Study,[41] visual acuity, bilateral, and unilateral visual function were measured, and quality of life evaluated using the National Eye Institute Visual Function Questionnaire (NEI VFQ-25). Vision-related dependency and poorer vision-related mental health were associated with severity of visual impairment. Similarly, in a population-based survey of Mexican-Americans aged 40 years and older,[45] increased measured visual impairment was

associated with declines across NEI VFQ-25 measures, particularly in physical tasks and in the mental health scale.

In data from 44- and 45-year-olds from the 1958 British birth cohort study,[38] a weak pattern of increased anxiety and poorer general health occurred in those with greater visual impairment.

Finally, a review of 29 studies addressed the psychosocial impact of visual impairment among working-age adults.[39] Among those studies, 20 of 52 outcome measures focused on depression and mental health and three on quality of life. Findings regarding depression were not consistent or conclusive, although poorer vision was generally associated with poorer mental health.

In a companion paper, we examined these same HRQoL measures among people aged ≥65 years.[10] There were differences (some expected and some not) between those aged 40–64 years and those aged ≥65 years; generally, the older the population, the higher the prevalence of visual impairment. Here, slightly more people aged 40–64 years reported a little difficulty seeing (23.0% vs 21.0%) and moderate/severe difficulty seeing (16.6% vs 15.3%) compared to those age ≥65 years. This finding was not expected. Moreover, the younger cohort, especially those with moderate/severe visual impairment, reported higher prevalences of life dissatisfaction (13.3% vs 8.4%) compared to older people. Younger people with moderate/severe visual impairment also reported more frequent mentally unhealthy days (21.7% vs 11.0%) compared to older people. Older people with little or moderate/severe difficulty seeing reported higher prevalences of disability and fair/poor self-reported health. In our adjusted model, however, the odds of younger people and older people with moderate/severe visual impairment experiencing poorer HRQoL did not differ substantially across our six measures. These findings suggest important differences in mental health concerns between age groups, differences that should inform tailored approaches to address mental health among younger and older people with visual impairment.

The purpose of the CDC HRQoL measures, to inform service needs and intervention outcomes, helps to define particular implications of these findings, namely poorer outcomes associated with increasing visual impairment. Moriarty and colleagues asserted “The Healthy Days surveillance data are particularly useful for finding unmet health needs, identifying disparities among demographic and socioeconomic subpopulations, characterizing the symptom burden of disabilities and chronic diseases, and tracking population patterns and trends.”[42]

HRQoL is subjective, and individuals may report better or worse results for many reasons. Multiple pathways may contribute to overall poorer or better HRQoL. One pathway may involve access to health care. Working-age people with visual impairment report difficulty getting access to and failure to use eye care, citing cost or no reason to go as major reasons for lack of care.[43,44] People with visual impairment also report less access to general health care and oral health care than people without visual impairment.[45,46] In our sample, about 20% of working-age people with moderate/severe visual impairment did not have health

insurance, compared to about 12% of those with no visual impairment. Moreover, over 25% of those with moderate/severe visual impairment reported medical care cost as a concern compared to 10% among those with no visual impairment.

Our findings draw attention to the role of chronic disease management among people with visual impairment that may lead to poorer HRQoL. We show that among working-age people with visual impairment, poorer HRQoL is associated with increased prevalence of chronic conditions (stroke, heart disease, and diabetes) and poorer health behaviors (increased smoking, decreased physical activity, and overweight and obesity). Chronic disease management may prove to be an avenue for improved HRQoL among individuals reporting visual impairment. Better understanding of the underlying modifiable factors and innovative strategies to address them may improve health and HRQoL.

The findings of this investigation are subject to several limitations. First, the findings are population-based for the 22 states in the sample, but may not be representative of the entire US population. Second, because BRFSS data are cross-sectional, we cannot tell whether visual impairment preceded the reported HRQoL issues, whether these issues preceded visual impairment, or whether both result from other potential confounding factors. However, after controlling for major potentially confounding factors, the association remained. Third, BRFSS data are self-reported and responses may be affected by recall bias, social desirability, or other factors. The BRFSS vision questions represent perception of visual function rather than objectively measured visual impairment. Furthermore, these questions neither provide information regarding duration of visual impairment, nor do they distinguish bilateral from unilateral visual impairment.

In conclusion, poorer HRQoL among people aged 40–64 years is strongly associated with severity of self-reported visual impairment. These findings suggest that research should address the underlying causes of poorer HRQoL among people who report visual impairment as well as potential interventions to improve both health and HRQoL.

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Table 1

Characteristics of study sample aged 40–64 years by visual impairment status in 22 States[a], Behavioral Risk Factor Surveillance System (BRFSS), 2006–2010, United States.

	n	Total % (95% CI)	No difficulty seeing % (95% CI)	A little difficulty seeing % (95% CI)	Moderate/severe difficulty seeing % (95% CI)	*p*-value[b]
Age group, years						0.002
40–54	58,849	67.7 (67.2–68.3)	67.1 (66.3–67.8)	69.6 (68.5–70.6)	67.7 (66.3–69.1)	
55–64	43,130	32.3 (31.7–32.8)	32.9 (32.2–33.7)	30.4 (29.4–31.5)	32.3 (30.9–33.7)	
Female	62,588	50.8 (50.1–51.5)	48.2 (47.3–49.1)	54.1 (52.8–55.4)	55.6 (54.0–57.2)	<0.001
Married	63,100	71.7 (71.2–72.3)	74.7 (73.9–75.3)	70.1 (69.0–71.2)	63.6 (62.1–65.1)	<0.001
Race/ethnicity						<0.001
Non-Hispanic white	81,942	75.9 (75.3–76.5)	77.4 (76.6–78.2)	76.4 (75.2–77.5)	70.1 (68.6–71.6)	
Non-Hispanic black	10,353	9.9 (9.5–10.2)	9.3 (8.8–9.7)	10.1 (9.4–10.8)	11.9 (11.0–12.8)	
Hispanic	5376	9.7 (9.2–10.2)	8.8 (8.2–9.5)	9.4 (8.5–10.3)	13.5 (12.3–14.8)	
Other	3578	4.5 (4.2–4.8)	4.6 (4.2–5.0)	4.1 (3.7–4.6)	4.5 (3.9–5.3)	
Educational level						<0.001
<High school	7789	8.4 (8.0–8.9)	6.6 (6.1–7.1)	8.0 (7.4–8.8)	15.6 (14.2–17.0)	
High school graduate	30,145	26.8 (26.2–27.3)	25.0 (24.3–25.7)	27.5 (26.4–28.6)	32.3 (30.9–33.7)	
>High school	63,951	64.8 (64.2–65.4)	68.4 (67.6–69.2)	64.5 (63.3–65.7)	52.2 (50.6–53.7)	
Annual household income >$35,000	61,204	71.3 (70.7–71.9)	75.9 (75.1–76.6)	70.6 (69.4–71.7)	55.7 (54.1–57.3)	<0.001
Employed	68,918	71.6 (71.0–72.2)	75.0 (74.3–75.8)	71.5 (70.4–72.6)	59.3 (57.8–60.9)	<0.001
Diabetes	11,654	10.3 (9.9–10.7)	8.7 (8.3–9.2)	10.8 (10.1–11.6)	15.2 (13.9–16.5)	<0.001
Heart disease	3572	4.1 (3.9–4.3)	3.3 (3.1–3.6)	3.9 (3.5–4.4)	6.8 (6.2–7.4)	<0.001
Stroke	3025	2.6 (2.4–2.8)	1.8 (1.6–2.0)	2.6 (2.2–3.0)	5.3 (4.5–6.2)	<0.001
Heart attack	3453	3.9 (3.7–4.1)	3.1 (2.9–3.4)	3.7 (3.4–4.2)	6.8 (6.2–7.5)	<0.001
Body mass index, kg/m^2						<0.001
Normal, <25	30,567	31.5 (30.8–32.1)	32.0 (31.1–32.8)	31.5 (30.3–32.7)	29.6 (28.1–31.1)	
Overweight, 25–<30	35,879	38.0 (37.4–38.7)	38.9 (38.0–39.8)	36.8 (35.5–38.1)	36.6 (35.1–38.2)	
Obese, ≦30	31,169	30.5 (29.9–31.1)	29.1 (28.3–29.9)	31.7 (30.5–32.9)	33.8 (32.2–35.3)	
Leisure-time physical activity	74,205	74.8 (74.2–75.4)	77.7 (76.9–78.4)	74.7 (73.7–75.7)	64.7 (63.2–66.2)	<0.001
Smoking status						<0.001
Current smoker	21,927	20.8 (20.3–21.4)	18.3 (17.7–19.0)	20.8 (19.7–21.9)	30.1 (28.6–31.5)	

	n	Total % (95% CI)	No difficulty seeing % (95% CI)	A little difficulty seeing % (95% CI)	Moderate/severe difficulty seeing % (95% CI)	*p*-value[b]
Former smoker	28,160	27.4 (26.8–28.0)	27.2 (26.4–28.0)	27.4 (26.3–28.6)	27.9 (26.5–29.4)	
Never smoker	51,579	51.8 (51.1–52.4)	54.5 (53.6–55.4)	51.8 (50.5–53.1)	42.0 (40.5–43.6)	
Regular health care provider	88,916	85.4 (84.9–85.9)	86.0 (85.2–86.6)	85.2 (84.2–86.2)	83.8 (82.7–84.9)	0.001
Medical care cost issues	14,213	13.8 (13.4–14.3)	10.2 (9.7–10.7)	14.7 (13.8–15.7)	25.7 (24.2–27.1)	<0.001
Health insurance coverage	88,819	86.5 (86.0–86.9)	88.1 (87.5–88.7)	86.4 (85.4–87.3)	80.7 (79.5–81.9)	<0.001

[a]The 22 states using the BRFSS vision module at least once in the years 2006–2010 include Alabama, Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Maryland, Massachusetts, Missouri, Nebraska, New Mexico, New York, North Carolina, Ohio, Tennessee, Texas, West Virginia, and Wyoming.

[b]P value is from chi-square test of the null hypothesis for equality of covariate levels across the levels of visual impairment.

CI, confidence interval.

Table 2

Unadjusted health-related quality of life among those aged 40–64 years by visual impairment status in 22 States[a], Behavioral Risk Factor Surveillance System (BRFSS), 2006–2010, United States.

Health-related quality of life measure	*n*	Total % (95% CI)	No difficulty seeing % (95% CI)	Little difficulty seeing % (95% CI)	Moderate/severe difficulty seeing % (95% CI)	*p*-value[b]
Life dissatisfaction						<0.0001
Yes	6915	5.8 (5.6–6.1)	3.7 (3.5–4.0)	6.0 (5.6–6.5)	13.3 (12.3–14.3)	
Disability						<0.0001
Yes	27,991	24.8 (24.3–25.4)	19.3 (18.6–19.9)	27.4 (26.2–28.5)	41.2 (39.7–42.8)	
Self-reported health						<0.0001
Fair/poor	19,182	17.1 (16.6–17.6)	12.4 (11.8–13.0)	17.8 (16.9–18.7)	33.0 (31.4–34.5)	
Physical unhealthy days						<0.0001
14–30 days	14,196	12.4 (12.0–12.8)	9.2 (8.7–9.7)	12.7 (12.0–13.5)	23.7 (22.4–25.1)	
Mental unhealthy days						<0.0001
14–30 days	12,386	11.0 (10.6–11.4)	7.7 (7.3–8.2)	11.7 (11.0–12.4)	21.7 (20.4–23.1)	
Activity limitation days						<0.0001
14–30 days	9571	8.2 (7.9–8.6)	5.5 (5.2–5.9)	8.5 (7.9–9.1)	17.8 (16.6–19.1)	

[a]The 22 states using the BRFSS vision module at least once in the years 2006–2010 include Alabama, Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Maryland, Massachusetts, Missouri, Nebraska, New Mexico, New York, North Carolina, Ohio, Tennessee, Texas, West Virginia, and Wyoming.

[b]Chi-square test of the null hypothesis for equality of covariate levels across the levels of visual impairment.

CI, confidence interval.

Table 3

Health-related quality of life among those aged 40–64 years in 22 States[a], Behavioral Risk Factor Surveillance System, 2006–2010, United States.

	Fair/poor health	Life dissatisfaction	Disability	Physically unhealthy days	Mentally unhealthy days	Activity limitation days
Visual impairment status	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Unadjusted model						
No difficulty seeing	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
A little difficulty seeing	1.32[b] (1.17–1.49)	1.59[b] (1.37–1.85)	1.58[b] (1.47–1.70)	1.29[b] (1.13–1.46)	1.45[b] (1.29–1.63)	1.60[b] (1.35–1.90)
Moderate/severe difficulty seeing	2.88[b] (2.53–3.28)	3.28[b] (2.79–3.87)	2.94[b] (2.72–3.18)	2.47[b] (2.14–2.84)	2.77[b] (2.43–3.16)	3.30[b] (2.81–3.86)
Adjusted model[c]						
No difficulty seeing	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)	1 (reference)
A little difficulty seeing	1.45[b] (1.31–1.61)	1.35[b] (1.18–1.55)	1.46[b] (1.35–1.58)	1.33[b] (1.20–1.48)	1.35[b] (1.22–1.50)	1.38[b] (1.22–1.57)
Moderate/severe difficulty seeing	2.01[b] (1.82–2.23)	2.06[b] (1.80–2.35)	1.95[b] (1.80–2.13)	1.69[b] (1.52–1.88)	1.84[b] (1.66–2.05)	1.94[b] (1.71–2.20)

[a]The 22 states using the BRFSS vision module at least once in the years 2006–2010 include Alabama, Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Indiana, Iowa, Kansas, Maryland, Massachusetts, Missouri, Nebraska, New Mexico, New York, North Carolina, Ohio, Tennessee, Texas, West Virginia, and Wyoming.

[b]$p < 0.001$.

[c]The adjusted model is adjusted for age, sex, marital status, race/ethnicity, education, annual household income, smoking status, leisure-time physical activity, body mass index, regular health care provider, medical care cost issues, health insurance coverage, self-reported history of chronic diseases (diabetes, heart disease, heart attack, and stroke), year, state.

CI, confidence interval; OR, odds ratio.