



# Visual impairment at baseline is associated with future poor physical functioning among middle-aged women: The Study of Women's Health Across the Nation, Michigan Site



Navasuja Chandrasekaran<sup>a,b</sup>, Sioban Harlow<sup>a</sup>, Sayoko Moroi<sup>b</sup>, David Musch<sup>a,b</sup>, Qing Peng<sup>a</sup>, Carrie Karvonen-Gutierrez<sup>a,\*</sup>

<sup>a</sup> University of Michigan, Department of Epidemiology, 1415 Washington Heights, Ann Arbor, MI 48109, USA

<sup>b</sup> University of Michigan Health System, Department of Ophthalmology, 1000 Wall Street, Ann Arbor, MI 48105, USA

## ARTICLE INFO

### Article history:

Received 9 August 2016

Received in revised form 28 October 2016

Accepted 14 November 2016

### Keywords:

Midlife

Middle-age

Physical functioning

Vision

Visual impairment

Women

## ABSTRACT

**Objectives:** Emerging evidence suggests that the prevalence rates of poor functioning and of disability are increasing among middle-aged individuals. Visual impairment is associated with poor functioning among older adults but little is known about the impact of vision on functioning during midlife. The objective of this study was to assess the impact of visual impairment on future physical functioning among middle-aged women.

**Study design:** In this longitudinal study, the sample consisted of 483 women aged 42 to 56 years, from the Michigan site of the Study of Women's Health Across the Nation.

**Main outcome measures:** At baseline, distance and near vision were measured using a Titmus vision screener. Visual impairment was defined as visual acuity worse than 20/40. Physical functioning was measured up to 10 years later using performance-based measures, including a 40-foot timed walk, timed stair climb and forward reach.

**Results:** Women with impaired distance vision at baseline had 2.81 centimeters less forward reach distance (95% confidence interval (CI): −4.19, −1.42) and 4.26 s longer stair climb time (95% CI: 2.73, 5.79) at follow-up than women without impaired distance vision. Women with impaired near vision also had less forward reach distance (2.26 centimeters, 95% CI: −3.30, −1.21) than those without impaired near vision.

**Conclusion:** Among middle-aged women, visual impairment is a marker of poor physical functioning. Routine eye testing and vision correction may help improve physical functioning among midlife individuals.

© 2016 Elsevier Ireland Ltd. All rights reserved.

## 1. Introduction

Visual impairment, defined as visual acuity worse than 20/40 [1], affects 14 million people in the United States and its prevalence increases with advancing age [2]. Visual acuity commonly referred to as clarity of vision, is the ability to distinguish letters and numbers at a given distance. The midlife period, comprising ages 40–65 years, is an important life stage for onset and progression of poor physical functioning and disability [4,5]. In addition, visual impairment prevalence triples during this life-stage [6].

Disability, which has traditionally been described as a chain of events starting with impairment and leading to limitation before the final onset of disability, affects 47.5 million people in the United

States [7,8]. It is of concern that an increasing trend of disability has been reported among midlife populations, with prevalence estimates ranging from 20 to 40% [5,8–10]. Visual impairment is a correlate of disability and poor functioning among elderly populations [11,12]. Among older adults, visual impairment predicts a greater decline in physical functioning and slower walking speed, thus adversely affecting the quality of life and dependency [13–17].

Many ophthalmologic conditions including cataract, glaucoma, and age-related macular degeneration that affect both distance and near vision as well as presbyopia that affects near vision are commonly diagnosed during the midlife [18,19]. Yet studies of the impact of visual impairment on functional decline during midlife are limited. Thus, the objective of this study was to assess the relationship of midlife visual impairment and future physical functioning. We hypothesized that women with poor visual acuity meeting the threshold for visual impairment during midlife would

\* Corresponding author.

E-mail address: [ckarvone@umich.edu](mailto:ckarvone@umich.edu) (C. Karvonen-Gutierrez).

have poorer performance-based physical functioning during the transition to early old age.

## 2. Methods

### 2.1. Study sample

The Study of Women's Health Across the Nation (SWAN) is a multi-site, multi-ethnic longitudinal study of the menopausal transition. Michigan is one of seven clinical sites for the study and includes a population-based sample from two Detroit-area communities identified using a community census based on electrical utility listings. Since the study's inception in 1996, the Michigan site has had a physical functioning protocol. Visual acuity was assessed from 1996 to 2007. The University of Michigan Institutional Review Board approved the study protocol and written informed consent was obtained from each participant at each study visit. This study conformed to the principles of the Declaration of Helsinki.

A total of 543 women were recruited to the Michigan SWAN cohort in 1996. Eligibility criteria at baseline included 42–52 years of age, having an intact uterus and at least one menstrual period in the previous 3 months, and no use of reproductive hormones in the previous 3 months [20]. Retention has been excellent; after 10 years of follow-up, 86% of still-living participants were actively engaged in follow-up.

For this analysis, each woman's first vision assessment characterized baseline visual acuity. For most women, vision was first assessed in 1996 (66.1%), 1997 (28.4%), or 1998 (2.1%). Only 3.5% were assessed for vision between 1999 and 2004. Each woman's last physical functioning assessment characterized future functioning. For most women, physical functioning was assessed in 2006 (84.5%), 2005 (3.4%), or 2004 (3.4%). Follow-up visual acuity was also measured at the time of physical functioning assessment. The analytical sample for this study included 483 women with at least one vision test and one subsequent assessment for physical functioning between 1996 and 2006. The average time between vision and physical functioning assessment was 9 years and 82% of women had at least 9 years of follow-up time.

### 2.2. Measures

#### 2.2.1. Vision

Visual acuity was assessed using the Titmus II vision screener, occupational model. The Titmus vision screener is a stereoscopic instrument that is widely used in occupational and school health settings to measure vision. Visual acuity was measured by presenting a self-lit slide while the participant was looking through the eyepiece of the instrument. Each slide contained group of diamonds shaped figures, each containing four rings with one ring having a break in the oblique axis. The participants were asked to name the position of the ring with a break. The test began by participants identifying the most easily identifiable ring and ended when two consecutive answers were missed. The instrument was designed to simulate a distance of 20 feet for distance vision measurement and 14 inches for near vision measurement. Glasses or contacts were permitted during the assessment, thus our measure of vision represented presenting visual acuity. Distance visual acuity was recorded as a fraction, with the denominator representing the distance in feet at which the participant identified the smallest shape and the numerator representing the distance at which a normal sighted person is expected to identify the same shape. Near visual acuity was also recorded as a 'distant equivalent' fraction.

Visual impairment, the primary exposure of interest, was defined as distance visual acuity of 20/40 or worse. The same cut point (20/40) was used to define near vision impairment. This

dichotomous visual impairment variable was used in all analyses. The definition of visual impairment used in this study corresponds to visual impairment criteria described by Center for Disease Control and Prevention, and is the vision requirement for obtaining an unrestricted driver's license in the State of Michigan [1,21]. Change in vision was defined as the difference between vision at the last and the first visit.

#### 2.2.2. Physical functioning

Objective physical functioning was measured by trained staff using performance-based measures including a timed 40-foot walk (seconds), timed stair climb (seconds) and forward reach (centimeters). The physical functioning variables selected for analysis in this study were chosen a priori given the theoretical role of vision on performance.

The 40-foot walking test measured the time in seconds that elapsed while participants walked a 40 foot distance at a "brisk, purposeful pace". The timed stair climb task required participants to ascend and descend four standardized stairs three consecutive times. The time began with the toe-off of the leading leg at the start of ascent and ended with the final foot contact of the trailing leg after descent of the final cycle. Forward reach distance was measured by asking the participants to extend their dominant arm parallel to the floor while standing and reach forward the greatest distance possible while maintaining their arm in the same horizontal plane. Their reach distance was measured in centimeters as the distance between their starting point and maximum reach point.

#### 2.2.3. Covariates

Age was calculated as date of visit minus date of birth. Race/ethnicity was self-reported as either African American or White. Level of economic strain was categorized as not at all, somewhat or very hard based on the participant's response to the question: "How difficult is it to pay for the very basics such as food, medical care, housing and heating?" Education level was categorized as less than high school, high school, more than high school, college or post-college. Height measured in centimeters (cm) and weight measured in kilograms (kg) was assessed using a stadiometer and calibrated balance beam scale respectively, and was used to calculate body mass index (BMI) in (kg/m<sup>2</sup>). Participants were categorized as obese (BMI  $\geq$  30 kg/m<sup>2</sup>) and not obese (BMI < 30 kg/m<sup>2</sup>).

Self-reported bleeding patterns were utilized to ascertain the participant's menopausal status. Menopausal status was categorized as postmenopausal if amenorrhea was reported for more than 12 months or if the participant had surgical removal of uterus and/or both ovaries and premenopausal if there was no report of amenorrhea for at least 12 months. Exogenous hormone use such as birth control pills, estrogen pills, injectable estrogen/progestin and progestin pills were self-reported. Smoking status was based on self-report.

Diabetes (DM) status was determined based on a self-report of doctor-diagnosed DM, fasting blood glucose  $\geq$  126 mg/dl and/or current use of diabetes medications. Hypertension (HTN) was defined as self-reported doctor diagnosed HTN, use of anti-hypertensive medications, or measured systolic blood pressure  $\geq$  140 mmHg or diastolic blood pressure  $\geq$  90 mmHg. Doctor diagnosed stroke, heart attack and angina were self-reported.

### 2.3. Statistical analysis

Continuous independent and dependent variables were examined for normality and outliers. Means and standard deviations were calculated for the outcome measures and continuous covariates including age and BMI. Frequencies and percents were tabulated for vision and categorical covariates. Covariates were identified by a priori knowledge, literature review and bivari-

Download English Version:

<https://daneshyari.com/en/article/5503571>

Download Persian Version:

<https://daneshyari.com/article/5503571>

[Daneshyari.com](https://daneshyari.com)