

Factors associated with Poor Self-Rated Health According to Visual Impairment Severity*

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I. Introduction

It is estimated that at least 2.2 billion people worldwide have visual impairments. Of these, at least 1 billion have visual impairments that could have been prevented or that resulted from inappropriate treatment (World Health Organization, 2019). In South Korea, the number of those officially registered as visually impaired increased significantly from 198,456 in 2005 to 266,823 in 2017 (Ministry of Health and Welfare, 2019), posing a serious social problem.

Criteria to determine visual impairment vary from country to country. Based on best-corrected visual acuity, the World Health Organization (2019) classifies an individual as blind if their best-corrected visual acuity is below 3/60, as having severe visual impairment if it is below 6/60, and as having moderate vision if it is below 6/18. Best-corrected visual acuity below 6/18 or above 3/60 is defined as low vision. In

South Korea, visual impairment is classified as severe or mild; best-corrected eyesight of 0.06 or less is considered severe, and best corrected eyesight of 0.1 or less is considered mild visual impairment (Ministry of Health and Welfare, 2019).

An acquired disability refers to not having a disability until a certain period of life and becoming disabled due to an accident or illness. One study reported that 92.4% of visual impairments were caused by acquired diseases or accidents, and that the incidence of such impairment increased rapidly in males aged over 50 years and in females aged over 60 years due to the high prevalence of chronic diseases, such as age-related ocular disease (particularly age-related macular degeneration), glaucoma, cataracts, and diabetic retinopathy in older adults (Chong, Jackson, Wolffsohn, & Bentley, 2016). Further, the incidence of visual impairment is expected to increase steadily due to the rising

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numbers of older adults globally.

Visual impairment adversely affects quality of life, personal independence, and one's ability to engage in social activities (Ni et al., 2020; Shim & Han, 2012). Since those with acquired visual impairments are required to re-establish their self-identity and restart their lives, they experience significant psychological stress. Consequently, the negative effects of visual impairment experienced by these affected individuals and their families have been considered to be significantly greater than those experienced by individuals who are congenitally visually impaired (Song & Oh, 2017).

Visual impairments are associated with an increased risk of death (La Forge, Spector, & Sternberg, 1992). The morbidity rate among disabled people in Korea (33.7%) is approximately twice that of the general population (17%). Understanding the nature and extent of comorbidities in this group would be likely to help inform decisions concerning how medical practice and healthcare services can be improved in relation to those with visual impairments. Causes of death, in particular, have been reported to vary according to the severity of visual impairment (Court, McLean, Guthrie, Mercer, & Smith, 2014; Park, Im, & Kim, 2018), which highlights the need to take health-related characteristics specific to varying levels of impairment severity into account when planning care for this population. In severe cases of visual impairment, direct causes of death have been attributed to malignant neoplasms, congenital abnormalities, diabetes mellitus, heart disease, and cerebrovascular disease, and, in mild cases of visual impairment, to malignant neoplasms, cardiovascular diseases, congenital abnormalities, injury and poisoning, and diabetes mellitus. Since these causes are preventable, the relevant

factors associated with patients' health status should be identified. Furthermore, direct and indirect factors affecting remaining visual acuity need to be distinguished and managed to improve the health status of individuals with acquired visual impairment (World Health Organization, 2019), and the overall health of these individuals maintained to minimize further disability and complications.

Desirable changes in lifestyle can improve health. The Lalonde report (cited in Terris, 1984) suggested that biological, environmental, medicinal, and lifestyle factors determine health, disease, and death in human life. Consequently, many studies have been conducted to improve health and health promotion programs for various groups. However, despite the elevated health risks associated with visual impairments, programs to enhance the health-related needs of individuals with visual impairments are seldom undertaken. Past studies on individuals with acquired visual impairment have explored the characteristics of individuals with low visual acuity in relation to rehabilitative care (Chong et al., 2016; Ni, et al., 2020) and their health education needs (Jeon, 2019), as well as physical and mental comorbidities in older adults with visual impairment (Court et al., 2014), and perceived health and self-care of patients with diabetes mellitus and visual loss (Leksell, Sandberg, & Wikblad, 2004), but the health and predictors of health among individuals in relation to visual impairment severity have not been examined. In order to identify nursing problems in individuals with acquired visual impairment, the study which assessed factors associated with poor self-rated health through classifying into either severe or mild visual impairment groups using nationally representative data, is needed.

Therefore, this study aimed to investigate poor self-rated health and associated health-related factors in individuals with acquired visual impairment, through classifying individuals into severe and mild visual impairment groups, to facilitate more effective nursing and related healthcare interventions that consider the degree of visual impairment severity involved.

II. Methods

1. Study design

This study was a descriptive survey and secondary analysis, using data obtained from the 2017 National Survey on Persons with Disabilities conducted by the Korea Institute for Health and Social Affairs, which aimed to identify the predictors of poor health in individuals with acquired visual impairment in relation to visual impairment severity.

2. Samples

The National Survey on Persons with Disabilities is conducted every three years in Korea. The 2017 National Survey on Persons with Disabilities involved 6,549 households that were determined using proportional stratified sampling of 45,180 sample households with registered individuals with disabilities in 17 cities and provinces. The Korea Institute for Health and Social Affairs conducted the 2017 National Survey on Persons with Disabilities after obtaining relevant institutional review board approval. We submitted a protocol for using raw data from that survey to the Korea Institute for Health and Social Affairs and obtained approval to conduct our study (Receipt No. 247, Oct 11, 2019).

Of the 6,549 households with registered

persons with disabilities selected in the 2017 National Survey on Persons with Disabilities in Korea, data from 629 individuals registered as having a visual impairment were first identified, from which 603 individuals with an acquired visual impairment were selected. From the selected data, 40 individuals with incomplete data (2 with no responses concerning health-related items, 38 with no responses to items concerning height and weight) were excluded, and data from 563 individuals were included in the final analysis.

3. Measures

Based on the Lalonde report (cited in Terris, 1984), poor self-rated health was considered as the dependent variable, and comorbidities, vision aids/health information, lifestyle, healthcare services, and sociodemographic characteristics were considered as independent variables.

1) Poor self-rated health.

This variable was assessed through determining the total score on five items concerning exercise ability, self-care, daily activities, pain/discomfort, and anxiety/depression, with each item rated on a 3-point Likert scale (1=no problem, 2=somewhat problematic, and 3=severely problematic). Higher scores indicated poorer self-rated health. The Cronbach's α of the tool was .83.

2) Comorbidities.

This variable referred to diseases related to visual impairment, including diabetes mellitus, hypertension, depression, cataracts, stroke, hyperlipidemia, and osteoarthritis.

3) Vision aids/health information.

This variable referred to the use of visual aids (glasses, electronic magnifiers, white canes,

braille information terminals), information and communication devices (smartphone, computer), and accessibility to health-related information (source of health information and needed health information categories).

4) Lifestyle.

This variable referred to information that was obtained on respondents' smoking behavior, alcohol consumption, exercise, regularity of meal patterns, balanced diet, and body mass index (BMI). Obesity was defined using the Asian classification system of BMI (kg/m^2) as follows: underweight ($\text{BMI} < 18.5 \text{kg}/\text{m}^2$), normal ($18 \text{kg}/\text{m}^2 \leq \text{BMI} < 25 \text{kg}/\text{m}^2$), obese ($\text{BMI} \geq 25 \text{kg}/\text{m}^2$).

5) Healthcare services.

This variable included healthcare service use and health checkups. Both healthcare utilization and health checkups were classified in terms of either use "yes" or non-use "no".

6) Sociodemographic characteristics.

This variable concerned information obtained on participants' gender, age, education, occupation, household type, monthly income, and braille reading. Household income was based on the average monthly household income according to Statistics Korea as of 2017.

4. Data Analysis

Data were analyzed using SPSS 25.0 (SPSS Inc., Chicago IL, USA.), and a P value < 0.05 was considered statistically significant. Differences in poor self-rated health according to demographic characteristics, comorbidities, vision aids/health information, lifestyle, and healthcare utilization and health checkups of individuals with severe visual impairment and of individuals with mild

visual impairment were analyzed using t-tests and analysis of variance (ANOVA). Variables with unequal variance were analyzed using a Welch test. A Scheffé test was used for post-hoc testing. The predictors of poor self-rated health in terms of acquired visual impairment severity were analyzed using multiple regression.

III. Results

1. Respondents' Poor Self-Rated Health

Individuals with severe visual impairment had higher scores (8.22) of poor self-rated health than did those with mild visual impairment (6.46). The difference in scores between individuals with severe visual impairment and those with mild visual impairment was highest in relation to daily activities, followed by self-care, exercise ability, anxiety/depression, and pain (Figure 1).

2. Differences in Poor Self-Rated Health According to Respondents' Sociodemographic Characteristics

The sociodemographic characteristics of the respondents in terms of visual impairment severity are shown in Table 1. Among these respondents with severe visual impairment, 52.9% were males and 47.1% were females. Most of these respondents (57.4%) were older adults, and the average age was 64.0 years. Regarding education level and employment status, most (52.9%) had below middle school education, and 76.5% did not have a job. Fifty percent of these respondents lived with children or relatives, and 25.0% lived alone. The average monthly household income was below 1.68 million Korean Won (KRW) for 52.9% of these respondents, and 82.4%

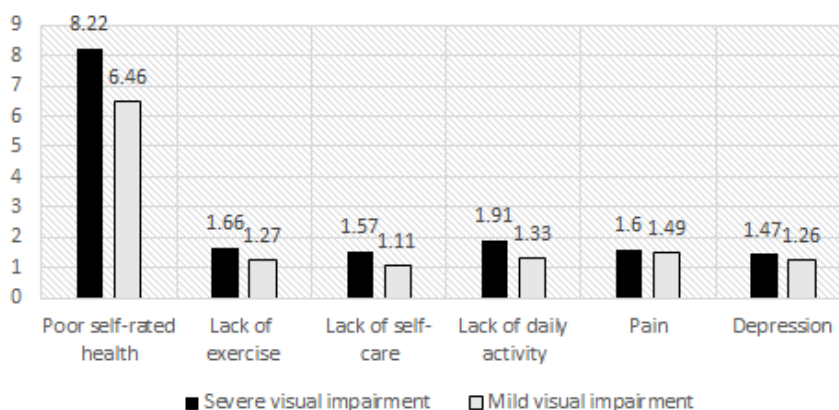


Figure 1. Level of respondents' poor self-rated health

of these respondents could not understand Braille.

Among the respondents with mild visual impairment, 59.2% were males and 40.8% were females. Most of these respondents (55.6%) were older adults, and the average age was 63.4 years. Fifty-six percent of these respondents had below middle school education, and 47.3% were employed. Most of these respondents (38.4%) lived with a spouse. The average monthly household income for 46.1% of these respondents was below 1.68 million KRW, and 99.0% of these respondents could not understand braille.

Among the individuals with severe visual impairment, those without jobs scored significantly higher on poor self-rated health than did those with jobs ($p=.006$). There were no significant differences in the other variables. Among the individuals with mild visual impairment, those who scored higher on poor self-related health included: females ($p<.001$); individuals ≥ 65 years or older as opposed to minors, middle-aged, and late-middle-aged individuals ($p<.001$); middle school graduates or lower as opposed to high school or college graduates or higher ($p<.001$); those without jobs ($p<.001$); individuals who lived

alone as opposed to people who lived with another person ($p=.001$); and low-income individuals (1.68 million KRW per month) as opposed to individuals with an income of 1.69 million KRW or higher per month ($p<.001$).

3. Differences in Poor Self-Rated Health in terms of Comorbidities, Vision Aids, Lifestyle, Healthcare Service Usage and Health Status

Table 2 shows the differences in poor self-rated health in terms of comorbidities, vision aids, lifestyle, healthcare service usage, and health status.

Those in the severe visual impairment group with depression reported higher poor self-rated health than those without depression ($p=.001$). There were no significant differences in the other variables. Those in the mild visual impairment group with diabetes mellitus ($p<.001$), hypertension ($p<.001$), depression ($p=.018$), cataracts ($p=.047$), stroke ($p=.014$), hyperlipidemia ($p<.001$), and osteoarthritis ($p<.001$) scored higher on poor self-rated health.

Regarding the use of visual aids, those in the

Table 1. Poor Self-Rated Health in terms of Demographic Characteristics (N=5663)

Division	Severe visual impairment (n=68)				Mild visual impairment (n=495)					
	n(%)	Mean±SD	t or F /Welch	ρ	Scheffé	n(%)	Mean±SD	t or F /Welch	ρ	Scheffé
Gender	Male	36(52.9)	8.0±1.8	-0.86	.390	293(59.2)	6.2±1.6	-4.02	<.001	
	Female	32(47.1)	8.4±2.0			202(40.8)	6.8±1.8			
Age(yr)	Minor (≤18)	0(0.0)				4(0.8)	5.2±0.5 ^b			
	Youth (19-34)	5(7.4)	7.8±1.1			17(3.4)	6.1±1.5			
	Middle-aged (35-49)	7(10.3)	7.4±2.2	1.17	.325	65(13.1)	5.6±1.0 ^b	18.86 [†]	<.001	a)b
	Late middle age (50-64)	17(25.0)	7.8±1.7			134(27.1)	5.9±1.2 ^b			
	Old age (≥65)	39(57.3)	8.5±2.0			275(55.6)	6.9±1.9 ^a			
	Mean±SD /median (min-max)	64.03±16.47 /66.5(24-90)				63.4±14.8 /66.0(14-91)				
Education	Below middle school	36(52.9)	8.4±2.0	1.47	.236	277(56.0)	6.8±1.8 ^a	17.72 [†]	<.001	a)b
	High school	21(30.9)	7.6±1.7			134(27.1)	6.0±1.5 ^b			
	Above college	11(16.2)	8.5±1.8			84(17.0)	5.8±1.2 ^b			
Job	Yes	16(23.5)	7.0±1.4	8.20	.006	234(47.3)	5.7±1.1	26.41 [†]	<.001	
	No	52(76.5)	8.5±1.9			261(52.7)	7.0±1.9			
Living status	Living alone	17(25.0)	8.5±2.0	1.51	.227	111(22.4)	6.9±1.8 ^a	7.28	.001	a)b
	Living with spouse	17(25.0)	7.5±1.5			190(38.4)	6.4±1.8			
	Others	34(50.0)	8.3±2.0			194(39.2)	6.1±1.6 ^b			
Total monthly income(10,000 won)	≤168	36(52.9)	8.1±1.7	1.23 [†]	.344	228(46.1)	6.9±1.8 ^a	14.05 [†]	<.001	a)b
	169-328	18(26.5)	8.1±1.5			150(30.3)	6.1±1.4 ^b			
	329-472	10(14.7)	7.8±2.5			58(11.7)	6.0±1.9 ^b			
	≥473	4(5.9)	10.7±2.6			59(11.9)	5.7±1.2 ^b			
Braille decipherment	Mean±SD /median(min-max)	206.2±139.9 /157.5(45-600)				234.8±179.3 /190.0(0-1170)				
	Possible	12(17.6)	7.3±1.4	3.12	.082	5(1.0)	5.6±0.8	1.22	.269	
	Impossible	56(82.4)	8.4±2.0			490(99.0)	6.4±1.7			

† Welch test

Table 2. Differences in Poor Self-Rated Health in terms of Comorbidities, Vision Aids/Health Information, Lifestyle, and Healthcare Services (N=563)

Variables	Severe visual impairment (n=68)				Mild visual impairment (n=495)					
	n(%)	Mean±SD	t or F /Welch	ρ	Scheffé	n(%)	Mean±SD	t or F /Welch	ρ	Scheffé
Comorbidity										
Diabetes mellitus	Yes	16(23.5)	7.8±1.9	0.91	.341	121(24.4)	6.9±1.8	10.06	<.001	
	No	52(76.5)	8.3±1.9			374(75.6)	6.3±1.7			
Hypertension	Yes	29(42.6)	8.2±1.8	0.08	.919	212(42.8)	6.9±1.8	4.93	<.001	
	No	39(57.4)	8.2±2.0			283(57.2)	6.1±1.5			
Depression	Yes	10(14.7)	10.1±1.8	7.81	.001	22(3.2)	7.5±2.0	4.04	.018	
	No	58(85.3)	7.8±1.8			473(95.6)	6.4±1.7			
Cataract	Yes	3(4.4)	8.3±0.5	0.28	.788	52(10.5)	6.9±1.8	1.99	.047	
	No	65(95.6)	8.2±1.9			443(89.5)	6.4±1.7			
Stroke	Yes	3(4.4)	7.6±1.1	-0.50	.618	19(3.8)	8.0±2.5	2.71	.014	
	No	65(95.6)	8.2±1.9			476(96.2)	6.4±1.6			
Hyperlipidemia	Yes	6(8.8)	9.0±2.2	1.02	.308	72(14.5)	7.2±1.9	4.24	<.001	
	No	62(91.2)	8.1±1.9			423(85.5)	6.3±1.6			
Vision aids/health information										
Glasses (contact lens)	Yes	21(30.9)	8.4±2.1	0.72	.473	264(53.3)	6.3±1.5	-1.65	.099	
	No	47(69.1)	8.1±1.8			231(46.7)	6.6±1.9			
Electronic magnifier	Yes	7(10.3)	8.7±2.5	0.08	.719	6(1.2)	6.5±1.9	-1.14	.833	
	No	61(89.7)	8.6±2.3			489(98.8)	6.6±1.8			
White cane	Yes	30(44.1)	7.9±1.7	-1.21	.230	4(0.8)	6.7±1.5	0.32	.745	
	No	38(55.9)	8.4±2.0			491(99.2)	6.4±1.7			
Braille information	Yes	4(5.9)	7.2±1.5	-1.02	.307	0(0.0)		-	-	
	No	64(94.1)	8.2±1.9			495(100)	6.4±1.7			
Smartphone	Yes	21(30.9)	7.0±1.6	-3.60	.001	274(55.4)	5.9±1.2	-8.12	<.001	
	No	47(69.1)	8.7±1.8			221(44.6)	7.1±2.0			
Computer	Yes	10(14.7)	7.2±1.4	-1.82	.072	162(32.7)	5.6±1.0	-9.38	<.001	
	No	58(85.3)	8.4±1.9			333(67.3)	6.8±1.8			
Source of health information	Public office	4(5.9)	7.2±2.0			15(3.0)	7.4±2.4			
	Welfare center	2(2.9)	6.0±0.0			6(1.2)	6.3±0.8			
	Medical institution	14(20.6)	9.0±1.7			89(18.0)	6.3±1.8			
	TV/Radio	26(38.2)	8.1±2.0	1.83	.097	248(50.1)	6.4±1.6	4.95 [†]	<.001	a)b
	Internet	2(2.9)	5.5±0.7			48(9.7)	5.5±1.0 ^b			
Neighbors	16(23.5)	8.6±1.7			67(13.5)	6.6±1.7				
	None	4(5.9)	7.3±1.5			16(3.2)	7.8±2.5 ^a			

Table 2. Differences in Poor Self-Rated Health in terms of Comorbidities, Vision Aids/Health Information, Lifestyle, and Healthcare Services (N=563) (Continued)

Variables	Severe visual impairment (n=68)				Mild visual impairment (n=495)					
	n(%)	Mean±SD	t or F /Weich	p	Scheffé	n(%)	Mean±SD	t or F /Weich	p	Scheffé
Source of health information	Public office	4(5.9)	7.2±2.0			15(3.0)	7.4±2.4			
	Welfare center	2(2.9)	6.0±0.0			6(1.2)	6.3±0.8			
	Medical institution	14(20.6)	9.0±1.7			89(18.0)	6.3±1.8			
	TV/Radio	26(38.2)	8.1±2.0	1.83	.097	248(50.1)	6.4±1.6	4.95 [†]	<.001	a)b
	Internet	2(2.9)	5.5±0.7			48(9.7)	5.5±1.0 ^b			
Needed health information categories	Neighbors	16(23.5)	8.6±1.7			67(13.5)	6.6±1.7			
	None	4(5.9)	7.3±1.5			16(3.2)	7.8±2.5 ^a			
	Healthy life	19(27.9)	8.0±1.8			173(34.9)	6.3±1.7			
	Disease	24(35.4)	8.5±2.3			200(40.4)	6.5±1.7			
	Preventive checkup	12(17.6)	8.3±1.3	0.44	.818	71(14.3)	6.1±1.6	1.78 [†]	.128	
Lifestyle	Rehabilitation	9(13.2)	8.2±1.8			21(4.2)	7.3±1.8			
	Medical institution	0(0.0)				11(2.2)	6.0±1.5			
	Handicapped assistive device	4(5.9)	8.2±2.5			7(1.4)	6.0±1.5			
	Yes	13(19.1)	8.4±1.5	0.24	.623	92(18.6)	6.0±1.3	10.62	.001	
	No	55(80.9)	8.1±2.0			403(81.4)	6.5±1.8			
Drinking	Yes	23(33.8)	7.9±1.8	0.63	.428	173(34.9)	5.8±1.2	44.72	<.001	
	No	45(66.2)	8.3±1.9			322(65.1)	6.8±1.8			
Exercise	Yes	44(64.7)	8.2±1.9	0.29	.767	299(60.4)	6.2±1.4	-3.45	.001	
	No	24(35.3)	8.1±2.0			196(39.6)	6.8±2.0			
Regular meals	Yes	51(75.0)	8.3±2.0	0.94	.335	341(68.9)	6.4±1.7	0.63	.426	
	No	17(25.0)	7.8±1.6			154(31.1)	6.5±1.6			
Balanced diet	Yes	27(39.7)	8.3±2.4	0.40 [†]	.675	188(38.0)	6.0±1.4	18.36 [†]	<.001	
	Sometimes	34(50.0)	8.2±1.6			242(48.9)	6.5±1.7			
	No	7(10.3)	7.7±1.5			65(13.1)	7.6±2.1			
BMI(kg/m ²)	<18.0	5(7.4)	8.0±2.2	0.50	.684	31(6.3)	7.5±2.5	2.63 [†]	.053	
	18.0-24.9	39(57.3)	8.6±1.9			341(68.9)	6.4±1.7			
	≥25	24(35.3)	7.9±1.8			123(24.8)	6.4±1.6			
Health care services	Yes	65(95.6)	8.2±1.9	1.42	.159	485(98.0)	6.4±1.7	-0.06	.949	
	No	3(4.4)	6.6±2.0			10(2.0)	6.5±2.4			
Health checkup	Yes	45(66.2)	8.4±1.7	1.60	.112	418(84.4)	6.3±1.6	-3.82	<.001	
	No	23(33.8)	7.7±2.1			77(15.6)	7.3±2.1			

[†] Welch test

severe visual impairment group who did not use smartphones ($p=.001$) or the Internet ($p=.031$) scored higher on poor self-rated health. Individuals with mild visual impairment who did not use a smartphone, computers, and those who had no source of health information as opposed to those who obtained health information from the Internet ($p<.001$), scored higher on poor self-rated health.

There was no significant difference in the health status of the severe visual impairment group in terms of lifestyle. However, individuals in the mild visual impairment group who did not smoke ($p=.001$) or drink ($p<.001$) or exercise ($p=.001$) or have a balanced diet ($p<.001$) had significantly worse self-rated health scores. Not undergoing regular medical checkups was associated with worse self-rated health ($p<.001$).

4. Factors Associated with Poor Self-Rated Health According to Acquired Visual Impairment Severity

A regression analysis of the significant variables was performed to identify the factors associated with the self-rated health status of individuals according to acquired visual impairment severity (Table 3).

Depression ($p=.003$) and smartphone use ($p=.045$) were associated with poor self-rated health in the severe visual impairment group. Depression worsened self-rated health, while smartphone use was associated with decreased poor self-rated health. The overall explanatory power of this model was 25% and it was statistically significant ($p=.004$).

Factors associated with poor self-rated health in the mild visual impairment group were stroke ($p=.001$), hyperlipidemia ($p=.022$), osteoarthritis ($p<.001$), smartphone use ($p=.006$), lack of access

to medical care ($p=.020$), balanced diet ($p<.001$), low weight ($p=.024$), and health checkups ($p=.001$), with lack of balanced diet, having osteoarthritis, stroke, or hyperlipidemia, not undergoing regular medical checkups, and lack of information concerning policies related to the medical care system found to be associated with worsened poor self-rated health, whereas smartphone use was associated with improved self-rated health. The overall explanatory power of this model was 32.3% and it was statistically significant ($p<.001$).

IV. Discussion

The approach to managing disability is shifting from a rehabilitation paradigm that emphasizes overcoming physical and mental limitations and utilizing residual ability to a self-reliance paradigm that encourages an individual with disability to carry out daily and social activities (Kempen et al., 2004).

In this study, the severe visual impairment group was found to have poorer self-rated health than the mild visual impairment group, especially in terms of daily activities, self-care, and exercise ability. Among individuals with visual impairments who are considered legally blind, there is a 78% likelihood they will face difficulty in activities of daily living (Sloan, Ostermann, Brown, & Lee, 2005), and these difficulties are a strong predictor of mortality outcomes (Wang, Mitchell, & Smith, 2000). In addition, individuals with severe visual impairment are believed to be more dependent on their sense of proprioception and vestibular system to maintain balance (Horvat et al., 2003). Consequently, if somatosensory system information causes confusion, and if sensitivity in relation to joint and muscle receptors changes, it can become

with similar experiences, through sports, may help individuals with visual impairment become psychologically stable and facilitate a series of re-socialization processes (Nakade, Rohatgi, Bhatia, & Dhaliwal, 2017).

In this study, 42.6% of the individuals with severe visual impairment and 42.8% of the individuals with mild visual impairment had hypertension, which was much higher than the prevalence rate of hypertension (29.1%) among Korean adults aged over 30 years (Ministry of Health and Welfare, 2019). Hypertension and diabetes mellitus can cause retinal hemorrhage, leading to visual impairment, and bleeding and infarction of other organs, leading to major complications. One previous study (Court et al., 2014) suggested that the number of diseases an individual has is strongly related to self-rated health. Therefore, education on lifestyle improvement and medication is needed to manage hypertension and overall health, as well as to manage factors that may affect health beyond the direct influence of vision-related pathology.

In this study, smartphone use was found to be a common factor associated with being less likely to report poor self-rated health among both the severe visual impairment and the mild visual impairment groups. The number of individuals with visual impairment using smartphones has been increasing recently, as the speech synthesis feature in smartphones allows such individuals to read documents. According to recent studies (Chong et al., 2016; Kim & Song, 2014; Seo, Lee, & Han, 2018), smartphones are being widely used by individuals with visual impairment in South Korea for leisure, as well as to acquire and communicate a variety of information, including information related to health literacy. Health literacy involves a

cognitive social skill that reflects an individual's ability and motivation to understand and apply health information in order to maintain their health (Nutbeam, 2000), and deficiencies in health literacy are considered a cause of health inequality. Since health literacy affects behavior, such as engaging in health check-ups, immunizations, and medication use, as well as one's awareness and understanding of one's own health status (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011), it is important to increase accessibility to health information. In this study, 30.9% of the severe visual impairment group and 55.4% of the mild visual impairment group who were using smartphones also reported better self-rated health. Smartphones can provide health-related information faster and more accurately. This study indicates that smartphone use is an effective means to increase access to health information and to facilitate interaction with other people among individuals with acquired visual impairment, with mediating effects on self-rated health. Therefore, easily accessible health-related applications for individuals with visual impairment may help improve individuals' health literacy and thereby, their health behavior.

Further, depressive symptoms were associated with poor self-rated health in the severe visual impairment group. Individuals with acquired visual impairment experience a painful process involving elements of despair and sadness after losing their vision (Kwon & Park, 2019), and experience restrictions in their daily activities, which can lead to such individuals feeling alienated from society. Those with acquired visual impairment who become blind tend to experience more stress compared to those with congenital visual impairment. They also tend to experience more difficulty managing their vision

loss, which brings about significant physical, psychological, social, and economic changes (Jones, Rovner, Crew, & Danielson, 2009; Song & Oh, 2017). In this study, 14.7% of the severe visual impairment group had depression. Leo, Hickey, Meneghel, and Cantor (1999) reported that the incidence of depression in those with severe visual impairment was 2-5 times higher than that in the general population. However, although the incidence of depression in those with visual impairment is higher than in those with other disabilities, the prevalence of psychiatric counseling to manage depression in those with visual impairment is reportedly lower (Shim & Han, 2012). Depression is a treatable condition and can be identified through screening (Jones et al., 2009). Thus, providing guidance and education to help individuals with visual impairment to manage their emotions, as well as educating family members on how to respond to the emotional needs of individuals with visual impairment, might help reduce the incidence of depression among this vulnerable population.

Comorbidities (stroke, hyperlipidemia, and osteoarthritis), unbalanced diet, and low weight were associated with poor self-rated health in the mild visual impairment group. Older adults with visual impairment, especially those who live alone, have difficulties in buying and preparing food, which may lead to nutritional problems. Moreover, for those with diabetes mellitus, a balanced diet is crucial along with medication to prevent diabetic retinopathy from worsening. In this study, 23.5% of the individuals with severe visual impairment and 24.4% of the individuals with mild visual impairment had diabetes mellitus, approximately twice the prevalence of diabetes (11.3%) within the general Korean population over 30 years of age. Park et al. (2018) reported that those with severe visual impairment have

the highest mortality rate from diabetes mellitus among those in their 30s. Individuals with diabetes mellitus must continuously manage their diet and blood sugar levels. One case study on the possibility of self-care among patients with diabetes mellitus who were totally blind (Villeneuve, McVey, & Steinberg, 1983) reported that these patients were capable of self-care through being educated on the importance of self-care, being given consistent encouragement, and being trained in the use of insulin injection through touch, as well as through undergoing cycle ergometer training, and repetitive diet training. Because individuals with acquired visual impairment have restricted capabilities in their roles, individual differences should be taken into consideration in their self-care (Jeon, 2019; Leksell et al., 2005). A blood glucose monitor for the visually impaired has been developed, which provides glucose measurement information verbally. Further, Flex-Pens or Mirio-Pens are available, which involve the use of labels or color codes to indicate different types of insulin for patients with low vision and, for individuals who are blind, braille or tactile codes can be used to help such individuals distinguish different types of hypoglycemic agents or insulin. In addition, individuals' activities and exercise choices need to be assessed to help them exercise safely.

Furthermore, health checkups were associated with poor self-rated health in those with mild visual impairment. The health check-up rate among individuals with mild visual impairment was 84.4%, which was higher than that of the general Korean population (79.8%) over the age of 40 years in 2017 (Shim & Han, 2012). Since malignant neoplasms, heart diseases, and diabetes mellitus are the main causes of death for individuals with mild visual impairment (Park

et al., 2018), it is necessary to ensure that they undergo health checkups to detect and treat any such diseases.

This study, which assessed factors associated with poor self-rated health through classifying individuals with acquired visual impairment into either severe or mild visual impairment groups using nationally-representative data, has important implications. It provides valuable baseline findings to help devise more tailored healthcare policies for individuals with acquired visual impairment in consideration of their disability severity. It also reinforces the need for nurses and other healthcare professionals to provide detailed care for individuals with acquired visual impairment through assessing their comorbidities and lifestyle. However, this study has some limitations. First, the cross-sectional design of the study precludes causal inferences. Second, there may have been recall bias when individuals were responding to the items concerning their health behavior.

V. Conclusion

As the self-rated health of the severe visual impairment group was found to be significantly poor, rehabilitation in relation to performing daily activities and self-care and interventions to improve exercise abilities are needed. Depression was confirmed as a serious challenge for those with severe visual impairment. Nurses and healthcare professionals in related fields need to be aware of how individuals are likely to be struggling due to their blindness and help such individuals manage their disability more effectively while remaining independent so that they can continue to engage in social activities.

For the mild visual impairment group, having a comorbidity, not having a balanced diet, not

undergoing regular medical checkups, and lack of health-related information were found to have a worsened effect on their self-rated health. Smartphone use, however, was associated with better self-rated health.

It was notable that smartphone use helped alleviate poor self-rated health in both groups. Although this cross-sectional study could not identify a causal relationship between these two variables, it would seem that smartphone use may predict improved health literacy. Therefore, an application that provides disease- and health-related information to encourage behavioral change may well improve accessibility to relevant information and promote health behavior. Lastly, an Internet-based educational platform for establishing social networks and fostering self-management is needed, since most individuals with acquired visual impairment were found not to know braille and to have reduced mobility.

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ABSTRACT

Factors Associated with Poor Self-rated Health according to Visual Impairment Severity*

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Purpose: To identify the factors associated with poor self-rated health in individuals with acquired visual impairment through classification of such individuals into severe and mild visual impairment groups. **Methods:** This descriptive, cross-sectional, survey-based study analyzed data from 563 individuals with visual impairment due to acquired causes who had been recruited in the 2017 Korean National Survey on Persons with Disabilities. **Results:** Individuals with severe visual impairment reported poorer self-rated health. Mild depression ($p=.003$), and low smartphone use ($p=.045$) were associated with poorer self-rated health in those with severe visual impairment. The factors associated with poor self-rated health in those with mild visual impairment were comorbidities, low smartphone use ($p=.006$), needed health information ($p=.020$), unbalanced diet ($p<.001$), low weight ($p=.024$), and lack of health checkups ($p=.001$). **Conclusion:** Depression was found to be a predictor of poor self-rated health in individuals with severe visual impairment, which highlights the need for nursing and related healthcare intervention to lower depression in this specific population. Further, promoting social network building and providing health information using smartphones may serve to encourage appropriate health behavior in people with severe visual impairment who have reduced mobility and health literacy.

Key words : Acquired visual impairment, Poor health, Comorbidity, Health promotion

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