



# Quality of life in people with visual impairment compared with the general population

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## Abstract

**Aim** The aim of the present study was to examine quality of life and its associated factors among adults with visual impairment in Norway.

**Subject and methods** Of the 1216 adults contacted, 736 (61% response rate) participated in a cross-sectional survey. A general population probability sample served as reference (n=1792, 36% response rate). Differences between the populations were examined with independent *t*-tests for continuous variables and with Chi-square tests for categorical variables. Quality of life covariates were investigated with linear regression analysis.

**Results** People with visual impairment had lower quality of life than the general Norwegian population, across all age groups (mean QOL: 6.8 versus 7.6,  $p < 0.001$ ) and within all age groups (all  $p < 0.01$ ). Compared with the general population, people with visual impairment were less likely to report the highest levels and more likely to report intermediate levels of quality of life. Higher quality of life was associated with lower onset-age of impaired vision ( $B = -0.11$ ,  $p < 0.001$ ), having employment ( $B = 0.36$ ,  $p = 0.02$ ), lower levels of loneliness ( $B = -0.28$ ,  $p < 0.001$ ) and higher levels of social support ( $B = 0.40$ ,  $p < 0.001$ ) and general self-efficacy ( $B = 0.07$ ,  $p < 0.001$ ).

**Conclusion** Quality of life was lower among people with visual impairment and may be increased by promoting work participation, social inclusion, connectedness, and coping.

**Keywords** Blindness · Quality of life · Rehabilitation · Visual impairment

## Introduction

Visual impairment affects about 338 million people worldwide (Bourne et al. 2021), and is a heterogeneous condition that has diverse causes, levels of severity, and rates of progression. Partial or complete vision loss may impact many aspects of daily living (Kidd Man et al. 2020), including reading, driving, mobility, basic activities such as shopping for, preparing, and cooking meals, and other types of activities that must be performed to live independently and enjoy good quality of life. Visual impairment is associated with increased risk of accidents (Brunes and Heir 2021), falls (Dhital et al. 2010), and functional limitations (Laitinen et al. 2007). A central component of vision rehabilitation and other types of support services is to help people who have experienced vision loss in their efforts to adapt and manage daily life activities, and thus maintain or restore good quality of life (Binns et al. 2012).

Several studies have examined visual impairment in relation to quality of life among older people (Heine

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and Browning 2015; Tseng et al. 2018; Wang et al. 2014). Visual impairment has been found to be associated with lower quality of life (Good et al. 2008; Iecovich and Isralowitz 2004; Tseng et al. 2018; Wang et al. 2014), and having dual sensory loss (impaired hearing and vision) has been associated with lower quality of life compared to having either hearing or vision loss (Tseng et al. 2018). Reporting reduced mobility and an increasing number of health conditions has been related to poorer quality of life (La Grow et al. 2011), and quality of life has been shown to vary inversely with the degree of visual impairment (Seland et al. 2011). Taken together, the studies suggest that lower levels of functioning correspond with lower quality of life in people with visual impairment.

While several studies and reviews indicate that older people with visual impairment have poorer quality of life compared to same-aged people without visual impairment, fewer studies appear to be concerned with visual impairment and its consequences for young or middle-aged adults. However, the results of some studies indicate that the pattern of lower quality of life in people with visual impairment applies even in younger adult age groups (Crews et al. 2016; Langelaan et al. 2007; Park et al. 2015). Indeed, younger people are generally expected to contribute to society, and people with visual impairment may therefore experience vision loss as a more profound disruption of their lives, compared to older people. The review by Nyman and co-workers (2010) reported that working-age people with visual impairment had lower quality of life than people without visual impairment. However, in people with visual impairment, quality of life was higher among those with a positive view of the world and themselves (Nyman et al. 2010), suggesting that psychological coping resources are important for sustaining quality of life in the presence of visual impairment.

In addition to the often studied impact of functioning, quality of life in people with visual impairment may be related to a range of other factors, including current life circumstances as well as previous life events. Recent studies from Norway have found that people with visual impairment are often lonely, without employment, and have often been bullied or have experienced other adverse life events, such as physical or sexual assaults (Brunes et al. 2018, 2019; Brunes and Heir 2018, 2021). In turn, having experienced adverse life events has been associated with increased risk of mental disorders, such as depression (Brunes and Heir 2020a) and post-traumatic stress disorder (Bonsaksen et al. 2022). On the other hand, people with visual impairment have been found to possess high general self-efficacy levels, compared with the general population, possibly suggesting high coping skills and extensive mastery experience in handling life with the impairment (Brunes et al. 2021).

To summarize, while several studies and reviews exist with regards to the quality of life of people with visual impairment, the majority of studies are concerned with people of older age or people with specific eye diseases. Fewer studies have compared quality of life amongst people with visual impairment with quality of life amongst the general population. Moreover, the possible impacts of adverse life events and psychological and social resources on quality of life among those with visual impairment are still relatively unexplored. Therefore, in this study we aimed to examine quality of life in people with visual impairment in comparison to the general population across all age groups, and to examine factors associated with quality of life in people with visual impairment.

## Methods

### Sample

#### People with visual impairment

The study had a cross-sectional survey design. Data were collected among members of the Norwegian Association of the Blind and Partially Sighted, where a probability sample of members were invited to respond to a survey. Association members were eligible to participate in the study if they were 18 years or older, had a visual impairment diagnosis, and were able to speak and understand Norwegian. People who were younger than 18 years, who did not have a visual impairment diagnosis, and who were unable to understand Norwegian, were excluded. Structured telephone interviews took place between January and May 2017, and the data were collected through these interviews. Most association members were of higher age. To reach the entire population of people with visual impairment, the sample was stratified by age. Four age groups were pre-categorized (years: 18–35, 36–50, 51–65,  $\geq 66$ ) and across the different age groups an equal number of members were randomly asked to participate. We invited 1216 members to participate, and 736 (61%) agreed to participate. A sample flowchart can be found elsewhere (Brunes et al. 2018).

#### General population

We used the Norwegian Population Study (NorPop) (Bonsaksen et al. 2019a, b; Heir et al. 2019; Schou-Bredal et al. 2017) to extract general population data concerned with sociodemographic characteristics and quality of life. The NorPop study comprised a randomly selected sample of 5500 adults, stratified for living area, and largely representative of the general population. Age below 18 years, not

living in Norway and inability to understand Norwegian, were used as exclusion criteria. Self-administered postal questionnaires were used to collect the data, and data collection took place between 2014 and 2015. Of the eligible participants, nine persons had died, 21 were not able to fill out the questionnaire, and 499 had non-valid addresses. Of the remaining 4971 contacted individuals, 1792 (36%) responded by completing and returning the questionnaire. The sample was deemed to be fairly representative of the Norwegian general population (Bonsaksen et al. 2019a, b; Schou-Bredal et al. 2017).

## Measures

### Sociodemographic information

Data concerned with the participants' age (years), gender, size of place of residence ( $> 20,000$  versus  $\leq 20,000$  inhabitants), education level ( $\leq 9$  versus 10–12 versus  $\geq 13$  years in education), employment (employed or in education versus not employed nor in education), and marital status (married/cohabitant versus not married/cohabitant) were collected in both surveys. Education level was dichotomized (higher education versus lower levels) in the main analysis.

### Quality of life

Both surveys included a quality of life assessment. Quality of life was assessed with a single-item scale; Cantril's Ladder of Life Satisfaction (Cantril 1963). Scores ranged between 1 and 10, with 1 representing the worst possible life and 10 representing the best possible life. Cantril's Ladder is simple to use and requires very little time to complete, and is therefore extensively used as a measure of quality of life for people in all age groups (Levin and Currie 2014).

### Vision-specific information and other impairments

In people with visual impairment, we collected self-reported information about the degree of visual impairment (blindness versus moderate-to-severe impairment). Degree of visual impairment was categorized in accordance with the current version of the International Classification of Diseases (ICD-11) (World Health Organization 2022). We also inquired whether the vision loss was congenital or acquired, and whether the participants had other impairments in addition to the vision loss (no versus yes).

### Life events

People with visual impairment were also asked questions about life events and psychosocial factors. Lifetime experience with physical/sexual assault was assessed with the

relevant items from the Life Events Checklist for DSM-5 (LEC-5). The participants responded by indicating whether or not they had been exposed to physical or sexual assault during their lifetime. Participants indicating one or both types of assault events (physical/sexual) were classified as having experienced the event. Reliability and validity of the LEC-5 has been demonstrated in several populations (Gray et al. 2004).

Lifetime bullying was assessed with one question from the General Nordic Questionnaire for Psychological and Social Factors at Work (Ørhede et al. 2000). Before being presented to the question, participants were provided with this definition of bullying: 'To label something bullying or harassment, the offensive behaviour has to occur repeatedly over a period of time, and the person confronted has to experience difficulties defending himself/herself'. The participants were asked whether they had been subjected to any bullying or harassment during their lifetime. The response alternatives were 'yes' and 'no'. For each of the bullying and assault variables, 'not having experienced the event' was set as the reference value.

### Psychosocial factors

We assessed loneliness with the three-item Loneliness Scale, a scale which has demonstrated good internal consistency and high concurrent validity (Hughes et al. 2004). The three items are: (a) 'How often do you miss somebody to be with?', (b) 'How often do you feel socially excluded?', and (c) 'How often do you feel socially isolated?'. Each item is rated 1 (hardly ever), 2 (some of the time), or 3 (often). Together the items construct a continuous scale with the sum score ranging between 3 and 9, and higher scores indicating higher levels of loneliness. Cronbach's alpha in the current study was 0.81 (Brunes et al. 2019).

Social support was assessed with five items from the Crisis Support Scale (Joseph et al. 1992). The items were concerned with having (a) 'someone willing to listen', (b) 'contact with people in similar situation', (c) 'someone to talk to about thoughts and feelings', (d) 'sympathy and support from others', and (e) 'practical help'. Each item was rated between 1 (never) and 7 (always). Cronbach's alpha was 0.75 (Brunes and Heir 2020a). The social support variable was created by averaging the ratings for each of the scale items, resulting in a 1–7 scale with higher values indicating higher levels of perceived support.

General self-efficacy was assessed with the General Self-Efficacy Scale (Schwarzer and Jerusalem 1995). The scale is used to measure optimistic self-beliefs related to coping with daily life demands, tasks, and challenges. Example items include 'I can always manage to solve difficult problems if I try hard enough'

and ‘I am certain that I can accomplish my goals’. Respondents rate each of the ten items on a four-point scale from 1 (not at all true) to 4 (completely true). The sum score, ranging between 10 and 40, was used as a continuous variable. A previous Norwegian general population study demonstrated the scale to be unidimensional and to have high internal consistency between items (Bonsaksen et al. 2019a, b).

## Statistical analyses

Differences between populations (visual impairment versus general population) were examined with independent *t*-tests for continuous variables and with Chi-square tests for categorical variables. Factors associated with quality of life among people with visual impairment were examined with single and multivariable linear regression analyses. A series of initial analyses included the independent variables as single predictors (Model I). Second, all sociodemographic factors, vision-related factors, and life events were included as independent variables together (Model II). Third, the three psychosocial factors (loneliness, social support, and general self-efficacy) were included in a second block of independent variables (Model III), while adjusting for all variables included in Model II. Effect sizes were reported as unstandardized beta coefficients along with the corresponding 95% confidence interval (CI) of the effect size. Statistical significance was set at  $p < 0.05$ .

## Results

### Sample characteristics

The samples consisted of 736 individuals with visual impairment and 1792 individuals from the general population. There were no missing data among participants in the visual impairment sample. In the general population sample, the proportion of missing data ranged between 0% and 2% for the different variables. Table 1 shows data on men and women in both study samples. Compared to the participants from the general population, the participants with visual impairment, both men and women, had lower levels of education (48.9% versus 52.0% had higher education among men, whereas 42.7% versus 54.9% had higher education among women), were less frequently employed (54.4% versus 63.1% among men, 64.5% versus 67.7% among women), and were less often married (49.8% versus 76.3% among men, 44.9% versus 68.9% among women). Compared to their counterparts in the general population, men with visual impairment were younger (mean age: 51.1 years versus 55.7 years) and there were fewer women living in urban areas (43.7% versus 52.7%).

### Differences in quality of life

The distribution of the quality of life ratings in both samples is shown in Fig. 1. The mean quality of life score was significantly lower among people with visual impairment ( $M=6.8$ ,  $SD=2.0$ ) compared to the general population

**Table 1** Characteristics of people with visual impairment ( $N = 736$ ) and the general population ( $N = 1792$ )

Variables	People with visual impairment		General population	
	Men $n = 333$	Women $n = 403$	Men $n = 834$	Women $n = 945$
Age (years), mean ( <i>SD</i> )	51.1 (17.0)***	51.7 (17.3)	55.7 (15.9)	51.0 (17.0)
Age (years), range	18-95	18-84	18-93	18-94
Education, n (%)				
13 years or more	163 (48.9)**	172 (42.7)***	432 (52.0)	517 (54.9)
10-12 years	124 (37.2)	162 (40.2)	336 (45.0)	346 (36.7)
9 years or less	46 (13.8)	69 (17.1)	62 (7.5)	79 (8.4)
Employment, n (%)				
Employed or in education	181 (54.4)***	260 (64.5)***	526 (63.1)	640 (67.7)
Not employed nor in education	152 (45.6)	143 (35.5)	304 (36.5)	299 (31.6)
Size of place of residence, n (%)				
1-19999 inhabitants	172 (51.7)	227 (56.3)**	399 (48.4)	444 (47.3)
20000 inhabitants and more	161 (48.3)	176 (43.7)	426 (51.6)	494 (52.7)
Marital status, n (%)				
Married or cohabitant	166 (49.8)***	181 (44.9)***	634 (76.3)	647 (68.9)

*SD* standard deviation. Statistical tests are Chi Square (categorical variables) and independent *t*-test (age). Differences denoted as statistically significant indicate differences between populations within gender. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Fig. 1** Quality of life in people with visual impairment (N = 736) and the general population (N = 1792). *VI* visual impairment, *GP* general population



(M=7.6, SD=2.2,  $p < 0.001$ ). The difference was present within all age groups (range of mean difference: 0.5–1.2, each  $p < 0.01$ ). Descriptively, we observed that people with visual impairment were less likely than the general population to report the highest scores of life quality (scores 9 and 10), more likely to report scores in the mid-range (scores between 5 and 8), and that they to a similar extent reported scores in the lower range (scores  $\leq 4$ ).

**Factors associated with quality of life**

Factors associated with quality of life among individuals with visual impairment are shown in Table 2. In unadjusted analyses (Model 1), those aged 36–50 years had lower quality of life compared to those in the youngest age group (18–35 years). No other differences between age groups reached statistical significance. People who were married and employed

**Table 2** Associated factors of quality of life in people with visual impairment (N = 736), estimated using linear regression

	Model I <sup>a</sup>		Model II <sup>b</sup>		Model III <sup>c</sup>	
	Beta (95% CI)	p-value	Beta (95% CI)	p-value	Beta (95% CI)	p-value
<b>Sociodemographic factors</b>						
<b>Age groups (ref. 18–35 years)</b>						
36–50 years	-0.65 (-1.08, -0.22)	0.003	-0.56 (-0.99, -0.15)	0.008	-0.33 (-0.70, 0.04)	0.08
51–65 years	0.02 (-0.41, 0.44)	0.94	0.19 (-0.24, 0.62)	0.39	0.22 (-0.17, 0.60)	0.27
≥ 66 years	-0.13 (-0.56, 0.30)	0.55	0.39 (-0.12, 0.89)	0.14	0.25 (-0.20, 0.69)	0.28
Female gender (ref. male)	-0.04 (-0.34, 0.25)	0.77	0.11 (-0.17, 0.29)	0.45	0.03 (-0.22, 0.28)	0.84
Higher education (yes vs. no)	0.27 (-0.03, 0.56)	0.08	0.06 (-0.23, 0.35)	0.69	-0.07 (-0.33, 0.19)	0.59
Married/cohabitant (yes vs. no)	0.51 (0.21, 0.80)	0.001	0.42 (0.13, 0.71)	0.004	0.16 (-0.11, 0.42)	0.24
Employed (yes vs. no)	0.72 (0.42, 1.02)	< 0.001	0.67 (0.32, 1.01)	< 0.001	0.36 (0.06, 0.67)	0.02
<b>Vision-related factors</b>						
Blindness (ref. moderate/severe VI)	0.23 (-0.11, 0.57)	0.19	0.10 (-0.24, 0.43)	0.57	0.12 (-0.18, 0.42)	0.43
Onset-age of VI (cont., 10-year intervals)	-0.08 (-0.14, -0.01)	0.02	-0.10 (-0.17, -0.02)	0.007	-0.11 (-0.17, -0.05)	0.001
Other impairments (yes vs. no)	-0.86 (-1.16, -0.55)	< 0.001	-0.54 (-0.85, -0.23)	0.001	-0.15 (-0.43, 0.12)	0.27
<b>Serious life events</b>						
Bullying (yes vs. no)	-0.52 (-0.82, -0.22)	0.001	-0.35 (-0.66, -0.05)	0.02	-0.02 (-0.29, 0.26)	0.90
Physical or sexual assaults (yes vs. no)	-0.83 (-1.22, -0.43)	< 0.001	-0.45 (-0.82, -0.08)	0.02	-0.18 (-0.50, 0.14)	0.28
<b>Psychosocial factors</b>						
Loneliness (cont.)	-0.49 (-0.56, -0.42)	< 0.001			-0.28 (-0.36, -0.20)	< 0.001
Social support (cont.)	0.75 (0.64, 0.87)	< 0.001			0.40 (0.28, 0.52)	< 0.001
Self-efficacy (cont.)	0.14 (0.12, 0.17)	< 0.001			0.07 (0.04, 0.10)	< 0.001

Ref reference; vs versus; Cont. continuous; VI visual impairment. <sup>a</sup>Crude/unadjusted; <sup>b</sup>adjusted for age, gender, education, marital status, employment, severity of vision loss, onset-age of VI, other impairments, bullying, and physical or sexual assaults; <sup>c</sup>Model II + loneliness, social support, and self-efficacy.

reported higher quality of life, compared to their counterparts. Higher onset-age of visual impairment and having additional impairments were associated with lower quality of life. Having experienced bullying and physical or sexual assault were both associated with lower quality of life. Higher levels of loneliness were associated with lower levels of quality of life, while higher levels of social support and general self-efficacy were associated with higher quality of life.

In the partially adjusted Model II, including the sociodemographic, vision-related and life events variables together, the initial results were practically unchanged. With the inclusion of the psychosocial variables in Model III, having employment and lower onset-age of visual impairment remained significantly associated with higher quality of life. Having experienced bullying and physical or sexual assault were no longer associated with quality of life. Lower levels of loneliness, and higher levels of perceived social support and general self-efficacy, were associated with higher quality of life.

## Discussion

### Differences in quality of life

The lower quality of life among people with visual impairment is in agreement with the literature dealing with people of older age (Crews et al. 2016; Good et al. 2008; Iecovich and Isralowitz 2004; Langelaan et al. 2007; Park et al. 2015; Tseng et al. 2018; Wang et al. 2014). Our study adds to the literature by showing that the differences in quality of life apply to adults in all age groups. Our study also complements the literature by showing that the differences primarily apply to the highest levels of quality of life in that people with visual impairment to a greater extent recognize quality of life at moderate levels. The positive message is that there is no evidence that individuals with visual impairment are more inclined to experience the lowest levels of quality of life than people in the general population.

The findings suggest that being visually impaired makes it more challenging to reach the highest levels of the best imaginable life. Visual impairment may impact important aspects of daily living such as access and opportunity for information, communication, mobility, work, and leisure activities (Kidd Man et al. 2020; La Grow et al. 2011; Seland et al. 2011). The extent to which this is the case depends on how well a society has made it possible for people with visual impairments to live a social, meaningful, and full-fledged life.

### Factors associated with quality of life

The finding that quality of life was higher among those with lower onset-age of vision loss may have several explanations.

The ability to adapt to a life as a visually impaired person may be greater at a younger age (Brunes and Heir 2020b). It may be easier to acquire the skills needed to function well with impaired vision, and it may be easier to accept the impairment. It is plausible that the longing to be able to see will be greatest among those who have acquired the visual impairment later in life. People with late-onset visual impairment may to a greater extent perceive the loss of vision as something that could have been different in their best imaginable life, while people with congenital or early acquired vision loss to a greater extent acknowledge it as a basic premise in their life.

The higher quality of life among employed individuals supports the notion that employment could be a valuable source of life quality (Modini et al. 2016). Work enables independent living and offers financial security, social inclusion, and human dignity (Jahoda 1981; Thomas et al. 2005). We have recently published findings that show a significant gap in employment rates between the general Norwegian population and people with visual impairment (Brunes and Heir 2022). The fact that there are fewer people with visual impairment who are included in the labour market can contribute to a lower quality of life at the group level.

The finding that quality of life was higher among those with psychosocial resources such as lower levels of loneliness and higher levels of perceived social support and general self-efficacy is consistent with previous research findings in a number of general and age-specific populations (e.g., Bielderman et al. 2015; Eva et al. 2015; Kang et al. 2018; Klein et al. 2021; Mikkelsen et al. 2020; Musich et al. 2015). As previously shown, compared to the general Norwegian population, people with visual impairment experience more loneliness (Brunes et al. 2019). Individuals with visual impairment appears to be more easily left out and isolated from others. It is likely that a higher prevalence of loneliness can contribute to lower quality of life at the group level. On the other hand, we have also shown that individuals with visual impairment experience higher self-efficacy compared to the general Norwegian population (Brunes et al. 2021), probably due to positive coping experiences despite the visual impairment. This could contribute to an opposite effect, by reducing the differences in quality of life between the general population and people with visual impairment.

Previous experiences of bullying and physical or sexual assaults were associated with lower levels of quality of life, but these associations did not remain significant when we adjusted for psychosocial factors such as loneliness, social support, and general self-efficacy. The association between a history of bullying or abuse and lower levels of quality of life is consistent with findings from a number of general population studies (Frisén and Bjarnelind 2010; González-Chica et al. 2019; Haraldstad et al. 2019; Wilkins-Shurmer et al. 2003). Bullying or abuse experienced during childhood years, regardless of when the event happened or its duration, can have profound and long-lasting consequences for the victim's mental health and quality of life (Allison et al. 2009; González-Chica et al. 2019; Wolke and Lereya 2015). The lack of

association when adjusting for psychosocial factors may be due to the negative effects of bullying or abuse being mediated through a weakening of psychosocial resources. In fact, higher levels of loneliness and lower levels of self-efficacy were both associated with a previous history of bullying and physical or sexual assaults (Brunes et al. 2019, 2021). Victims of such assaults have more problems in making and keeping friends, and they are less likely to live with a partner and receive adequate social support (Brunes et al. 2019; Wolke and Lereya 2015). Thus, psychosocial resources can provide a theoretical model for quality of life and include the possible effects of negative life events.

### Strengths and limitations

Related to the sample of people with visual impairment, study strengths include the relatively large probability sample, the use of age-stratified sampling that ensured enough participants in all age groups, and the use of validated instruments for assessing quality of life and its associated factors. Related to the study as whole, the ability to compare people with visual impairment with people in the general population is an important strength.

The classification according to criteria in ICD-11 (World Health Organization 2022) means a medical approach was used in this study. Despite our use of a medical model terminology to describe visual impairment among the participants and in the population they represent, a mixed interaction-based approach is required for understanding disability, and indeed also quality of life, as reflected by our study results.

The study's scope was to examine differences in quality of life between people with visual impairment and the general population. While such differences were found across the age spectrum, they may also vary across intersecting social identifications such as gender, social class, and ethnicity. Future studies are needed to examine such possible intersections in greater detail.

The sample's ability to represent the population of people with visual impairment is a limitation. For example, people who were unable to speak Norwegian were excluded from participation, and this is problematic in an increasingly diverse society. However, a relatively large sample was recruited for participation in telephone interviews, and it was impossible to ensure that interviewers were sufficiently able to speak other languages. Moreover, the sample with visual impairment was recruited via the member organization; the Norwegian Association of the Blind and Partially Sighted, and it is possible that members differed from non-members of that particular organization. In comparison to census data (Statistics Norway 2021), gender, employment, and place of residence were not different for our study participants, but their education level was higher. Also, the proportion reporting blindness in our study was higher than reported previously (Cumberland and Rahi 2016). Self-reported information about serious life events, and indeed about all variables used in this study, may

have had an impact on the results. For example, in the retrospective reports of serious life events, recall bias is a common problem. While events may be forgotten or perceived to be less important, other events may have been amplified (Heir et al. 2009). We do not have information about non-participants in the study, and we are therefore unable to assess the potential importance of non-response on our study results.

Lastly, we used a global quality of life measure. Thus, we do not have information about how people with visual impairment perceive their quality of life related to specific dimensions. Moreover, associations between quality of life and other factors might be different if the quality of life measure was concerned with a specific dimension. However, while several instruments for measuring quality of life have been specifically designed to meet the needs of specific target groups, Cantril's ladder is widely used in international and cross-national research (Jorm and Ryan 2014). It is one of several measures used in the World Happiness Report, thereby demonstrating its credibility as a measure of global quality of life that can be used to compare groups, societies, and cultures (Helliwell et al. 2022).

### Conclusion and implications

The study shows that adult individuals with visual impairment in Norway have lower quality of life than the general Norwegian population across all age groups. This raises the question of whether it is possible to increase the quality of life for people with impaired vision. We have pointed out the importance of work and the fact that individuals with visual impairment have poorer access to the labour market (Brunes and Heir 2022). We have also emphasized the importance of psychosocial resources such as togetherness, social support, and self-efficacy. Such psychosocial resources are largely a result of the individual's interaction with the society. Removing barriers to social participation can increase self-efficacy and prevent social exclusion and loneliness. This may apply to general attitudes, legislation, and social, cultural, or physical structures (World Health Organization 2011). Structural changes are needed to ensure access to information, communication, mobility, work, social life, and leisure activities. A modern society has both the knowledge and the technology to solve many of the challenges faced by people with visual impairments. Combined with the political will to implement, it will most likely be possible to increase the quality of life of people with visual impairment in Norway.

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**Authors' contributions** TH led conception and design of the study. AB conducted the analyses. TB and TH contributed to the data interpretation. TB wrote the initial draft manuscript, while TB, AB and TH edited the manuscript draft. All authors reviewed the results, read, and critically revised the manuscript. All authors approved the final manuscript. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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**Data availability** Data are from the research project European Network for Psychosocial Crisis Management – Assisting Disabled in Case of Disaster (EUNAD). Public availability may comprise the privacy of the participants. According to the informed consent given by each participant, the data are to be stored properly and in line with EU Regulation 2017/679 (General Data Protection Regulation [GDPR]). However, anonymized data is available to researchers who provide a methodologically sound proposal in accordance with the informed consent of the participants. Interested researchers can contact project leader Trond Heir with a request for our study data.

**Code availability** Not applicable.

## Declarations

**Ethical approval** All methods were carried out in accordance with relevant guidelines and regulations, including the Declaration of Helsinki. For both research projects included in this study, the Regional Committees for Medical and Health Research Ethics (REC) South-East was consulted. According to their statement, no formal ethical approval was required for any of the studies, due to their collection of anonymous data only.

**Consent to participate** All participants gave consent to participate in the study.

**Consent for publication** Not applicable.

**Conflicts of interest** Grants received from the Norwegian Association for the Blind and Partially Sighted to AB. TB and TH: None declared.

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