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Health and Comorbidities in Minority Ethnic Adults Living with Visual Impairment in the UK

Syeda F. Hussain [1], Nikki Heinze [1,*] and Renata S. M. Gomes [1,2]

[1] BRAVO VICTOR, 3 Queen Square, London WC1N 3AR, UK; renata.gomes@bravovictor.org (R.S.M.G.)
[2] Northern Hub for Veterans and Military Families Research, Department of Nursing, Midwifery and Health, Faculty of Health and Life Sciences, Northumbria University, Newcastle NE7 7XA, UK
* Correspondence: nikki.heinze@bravovictor.org

Abstract: Visual impairment has been associated with mental and physical comorbidities in older adults. Research into comorbidities within minority ethnic communities (MEC) with visual impairment is yet to be explored, despite the increase in numbers. A secondary analysis of survey data collected by UK-based sight loss charities provides the first insight into comorbid conditions in a matched control sample of 77 MEC and 77 White adults aged 18–85 years. Participants were matched based on age, gender, UK region, and urban/rural setting. Group differences were explored, and subgroup analysis was also carried out for the two largest subgroups within the MEC group: Asian (n = 46) and Black (n = 22). Response frequencies (n) and proportions (%) were calculated for all variables including eye conditions, vision difficulties, comorbid conditions, and exercise. The sample was predominantly young, and few significant differences were found. Sub-group analysis showed that Asian participants were more likely to report not doing any exercise, having bad health, and comorbidities including high blood pressure, dexterity, hearing and communication difficulties, and a recent emotional/psychological/mental health condition. Black participants, however, were more likely to report comorbidity, in particular physical conditions and mobility difficulties.

Keywords: visual impairment; blind; sight loss; ethnicity; comorbidities; health; eye conditions; physical activity

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1. Introduction

By 2050, the number of people living with visual impairment (V.I.) in the United Kingdom (UK) is estimated to increase to approximately 4 million from the current estimate of around 2 million [1]. V.I. has been associated with an adverse impact on mental health, including a higher prevalence of depression and anxiety [2–6]. Prevalence of V.I., along with certain other conditions such as dementia, diabetes, and cardiovascular disease, increases with age [7]; thus, the presence of comorbidities in the older V.I. population is not uncommon. Indeed, in comparison to controls without V.I., older adults with V.I. have been found to have a greater number of comorbidities [8]. Research into comorbidities in people with V.I. has largely focused on older adults [8–10], while studies looking at younger age groups are limited. Data from the V.I. registers held by Scottish Local Authorities showed that around 35% of children and adults who are registered blind in Scotland have additional disabilities, including 39% of children under the age of 16, 39% of working-age adults (aged 16–64), and 33% of older adults aged 65 or over [11]. Multiple disabilities followed by physical disabilities were most common among blind children. Physical disabilities were most common among adults, followed by learning difficulties among working-age adults and hearing impairments among older adults [11]. In glaucoma patients in Saudi Arabia (median age = 66 years), the most common comorbidities were hypertension (60.8%), diabetes (53.8%), and obesity (43.1%) [12]. It should be noted that not all patients in this study had V.I.: 16.0% had normal vision, while 19.2% had near normal vision and 64.8%

had moderate V.I. to legal blindness. Survey research with 172 adults aged 18–25 years enrolled at Dutch low vision rehabilitation centres found that 40.7% reported some type of comorbidity, although the types were not specified [13].

Adults from minority ethnic communities (MEC) constitute an increasing proportion of the population in England and Wales, according to the 2021 UK Census [14]. MEC adults have been found to be at increased risk of V.I. [15,16] and certain eye conditions which can lead to V.I. [17–19]. A UK survey of 2077 adults aged 18 and over showed that, when self-rating the quality of their vision, people from MEC were around twice as likely to rate their vision as Poor/Very Poor in comparison to those who were White British (14% vs. 7%, respectively) [20]. However, studies focusing on the experiences of MEC adults living with V.I. in the UK are scarce. A recent rapid evidence review identified gaps in the evidence relating to the support needs and experiences of services along the eyecare pathway of MEC adults living with V.I. in the UK [21]. Much of the research identified in this review focused on early detection of vision problems in MEC, while data on ethnicity in relation to physical and mental health outcomes were missing. Elsewhere, a large observational study in the US [22] involving beneficiaries of Medicaid explored the relationship between V.I. and physical and mental health outcomes. In this study prevalence of low vision was highest amongst Hispanic followed by Black beneficiaries. Black, Hispanic, and Native American beneficiaries had greater adjusted odds of having a low vision diagnosis than White beneficiaries. When adjusting for demographic variables (e.g., race/ethnicity, gender, age, and Medicaid eligibility) and relevant comorbidities, low vision was found to be significantly associated with increased odds of hip fractures, depression, anxiety, and Alzheimer's disease. Whilst the study identified an association between V.I. and comorbidities, it did not report prevalence of comorbidities among the different ethnic groups nor among the younger demographic. Data on comorbidity in minority ethnic groups and young people without disabilities are limited [23], despite evidence of a higher prevalence of some health conditions in people from MEC. Diabetes is perhaps one of the most studied physical health conditions in terms of ethnic health disparities. Around 7% of the population in England and Wales were reported to have diabetes in 2019–2020 [24], and there is a significant body of evidence that suggests that diabetes is more prevalent in Black and Asian than White communities [25–28]. Data modelling based on a London cohort estimated that, by the age of 80, 40–50% of South Asian and African-Caribbean people will have Type 2 diabetes (T2DM)—a rate that was double the proportion of age-matched White counterparts [29].

Regular exercise has been associated with better physical and mental health outcomes, including reduced risk of diabetes, heart disease, and blood pressure as well as lower levels of stress, anxiety, and depression [30,31]. However, disability, including V.I., has been linked with a negative impact on participation in physical activity [32–34]. Having a V.I., for instance, may impact on mobility and the ability to exercise as navigation can be more difficult [35]. In addition, people with V.I. tend to walk at slower speeds and have more falls compared to those without V.I. [36], which may further impact their confidence and/or ability to exercise. Previous research has also identified an association between physical activity and ethnicity. Physical activity levels among UK adults aged 16+ were found to be highest among those from Mixed backgrounds and lowest among those from Asian, particularly Pakistani and Bangladeshi, as well as Arab backgrounds [37,38]. Physical activity levels also tend to be higher among White compared to Black adults [37,38]. However, few studies have considered ethnic group differences in physical activity in adults living with disabilities [38,39] and V.I. specifically [40].

Taken together, this suggests that, although MEC adults will make up an increasing proportion of the UK V.I. population, relatively little is known about physical activity levels and comorbidities among this group. The presence of comorbidities may result in a greater impact on overall health, more complex care and rehabilitation needs, as well as more challenges to aspects of daily living, and are thus important to consider. This article forms part of a series which explores the wider experiences of MEC adults with V.I. [41–43]. It

attempts to address some of the gaps in the existing knowledge and provide preliminary insights into comorbidity and exercise participation among a comparatively young sample (age range: 18–85 years) of adults with V.I. from different ethnic groups in the UK.

2. Materials and Methods

This study provides secondary analysis of survey data that was collected as part of the 'V.I. Lives Survey' project commissioned by several charities in the UK sight loss sector: the Royal National Institute of Blind People (RNIB), the Thomas Pocklington Trust (TPT), and Guide Dogs for the Blind Association (Guide Dogs) (the data controllers). Permission to analyse the anonymised data for the purposes of this series of articles was granted by the data controllers. Details relating to participant recruitment and data collection have been described in the original report [44], and a more detailed description of these is also provided in another article in this series [43].

The V.I. Lives survey was a UK telephone survey of people living with V.I. covering a wide range of topics, including health, education, employment, assistive technology, etc. Data were collected in two waves: December 2019 to March 2020, and August 2020 to November 2020. Data were collected by the market research agencies Insight Angels and Acumen Fieldwork. Recruitment of participants was via Acumen's healthcare database of people who had agreed to be contacted for market research, as well as national and local V.I. and wider charities, social media, and radio adverts. Exclusion criteria included non-English speakers and those without V.I. Eligibility was assessed in an initial phone call where potential participants were first asked if they had 'any difficulty seeing or wear glasses or contact lenses?' V.I. severity was then determined by the interviewer via coding of responses to a set of questions that asked about the participant's registration status (registered as severely sight impaired/partially sight impaired/unsure of the category in which they were registered/not registered) and whether they were legally allowed to drive. Participants were also asked about any difficulties in reading newsprint, seeing a person from a certain distance, and difficulties seeing people or things in the periphery of their vision to ascertain their near, distance, and peripheral vision. Participants who reported wearing glasses or contact lenses were prompted to rate difficulties when wearing their glasses or contact lenses to assess best-corrected vision. Response options for these were: 'cannot do', 'severe difficulties', 'moderate difficulties', 'mild difficulties', and 'no difficulties'. Participants were categorised as having mild, moderate, or severe V.I. based on their responses to these three questions (Supplementary Figure S1). Individual classifications assigned to participants were discussed with the charities that commissioned the survey and amended to reflect individual participants' experiences. The pre-coded severity variable was included in the deidentified data set delivered by the data controllers. As with any self-report question, self-reported V.I. relies on a respondent's honest and accurate assessment of their vision. Two comparisons of subjective and objective measures of V.I. found some over-identification of V.I. when using subjective vs. objective measures [45,46], but both concluded that self-report measures were a valid and suitable indicator of V.I., which continues to be used in V.I. research [9,45,47–52], including in general population surveys in the UK [53].

2.1. Measures

This article focuses on data relevant to health, i.e., eye conditions, vision difficulties, general health, physical, emotional, psychological and mental, and neurodevelopmental comorbidities and other impairments or difficulties, and exercise.

A single question was used to determine ethnicity. Participants were asked how they would describe their ethnic background, and the response options provided were: White British, White other, Mixed/multiple ethnic groups, Asian/Asian British, Black/African/Caribbean/Black British, Other ethnic group, and Prefer Not to Say.

Eye health was explored with a series of questions which asked participants to indicate which eye condition(s) they had ('What eye condition (or conditions) do you have?'),

specific symptoms ('Can you please tell me what issues you have in terms of vision?'), and changes in their vision ('Has your vision recently improved or deteriorated, or stayed the same?').

General health and comorbidities were assessed by asking participants about their self-reported health ('How is your health in general? Is it very good, good, fair, bad, or very bad?'), physical health conditions other than V.I. ('Do you have any long-term physical health issues? For example, this includes things like diabetes, high blood pressure, or arthritis.'), neurodevelopmental conditions ('Do you have any of these conditions? Down's syndrome, autism, dyslexia, ADHD, other, none of these.'), other impairments ('Do you experience any of the following?' followed by a list including statements such as 'difficulty hearing or use a hearing aid and difficulty speaking or making yourself understood'), and recent experiences of mental health difficulties ('Have you recently experienced any emotional, psychological, or mental ill-health conditions? These include things like obsessive or compulsive behaviours, anxiety, extreme phobias, depression, PTSD, schizophrenia, drinking or drug problems, or eating disorders.').

Finally, participation in exercise was assessed by asking the following two questions: 'Are you able to take part in physical exercise as much as you would like?' and 'Which of these best describes how much regular sport and exercise you do? By sport and exercise, we mean activities in home or out including swimming, walking, fitness classes, dance, yoga, or Pilates, team sports. It doesn't include housework or physical activities that are part of your job'.

2.2. Sample

A total of 745 adults aged 18 and over participated in the survey, including 78 adults from MEC and 667 from White communities. There were no statistically significant differences between these two groups in terms of gender, X^2 (1, 742) = 0.63, $p = 0.427$, nor V.I. severity, $U = 28365.5$, $p = 0.092$, but MEC adults were statistically significantly younger ($M = 40.9$ years) than their White counterparts ($M = 58.7$ years), t(743) = 9.37, $p < 0.001$. In addition, there were statistically significant differences between MEC and White adults in their location in the UK, X^2 (11, 741) = 71.69, $p < 0.001$, Cramer's V = 0.311, and whether they lived in a rural vs. town setting, X^2 (2, 741) = 26.38, $p < 0.001$, Cramer's V = 0.189. To control for these group differences and the unequal subgroup sizes, the findings in the current article relate to a matched control sample consisting of 77 White and 77 MEC participants, including 46 from Asian/Asian British, 22 from Black/African/Caribbean/Black British, 3 from Mixed or Multiple Ethnic communities, and 6 from Other Ethnic communities. The matched control sample was drawn using R [54] based on gender, age, region, and residence in a rural area versus a town.

2.3. Statistical Analysis

The statistical analysis in this study was carried out using SPSS (Version: 28.0.1.1) [55]. Response frequencies (n) and proportions (%) were calculated for all variables. Subgroup analysis consisted of comparing the 77 MEC to the 77 White participants and comparing the 46 Asian to the 22 Black participants in the matched control sample. The latter was included despite the small sample sizes to provide preliminary insights into the experiences of the diverse communities included in the MEC group, which may have very different health-related experiences. Group differences were analysed using Mann–Whitney U tests for ordinal variables, t-tests for continuous variables, and chi-square tests for categorical variables. Where test assumptions for chi-square tests relating to expected cell frequencies were violated, Fisher's exact tests were calculated in R. Fisher's exact results only were calculated to compare prevalence of eye and physical health conditions among Asian and Black participants because fewer than three of the individual conditions met test assumptions for chi-square tests. Results of Fisher's exact tests are reported as p-values only.

3. Results

3.1. Participant Characteristics

Table 1 provides a summary of the demographic characteristics of the four subgroups. There were no statistically significant differences between MEC and White participants, nor between Asian and Black participants, in terms of their gender, age, region, and setting. Age ranged from 18 to 85 among MEC and WC participants, and a large proportion of the sample was aged between 18 and 65 years (90.9%).

Table 1. Participant characteristics (age, gender, region, and setting), by subgroup.

		Asian (*n* = 46) % (*n*)	**Black (*n* = 22) % (*n*)**		**MEC (*n* = 77) % (*n*)**	**White (*n* = 77) % (*n*)**	
Age (years)	M (SD)	40.2 (14.6)	39.2 (14.7)	U = 500.5, p = n.s.	40.8 (15.6)	41.1 (15.6)	U = 2919.5, p = n.s.
	18–25	13.0 (6)	27.3 (6)		16.9 (13)	16.9 (13)	
	26–35	39.1 (18)	9.1 (2)		28.6 (22)	27.3(21)	
	36–45	13.0 (6)	31.8 (7)		19.5 (15)	20.8 (16)	
	46–55	19.6 (9)	18.2 (4)		18.2 (14)	18.2 (14)	
	56–65	6.5 (30)	9.1 (2)		7.8 (6)	7.8 (6)	
	66–75	8.7 (4)	4.5 (1)		7.8 (6)	6.5 (5)	
	76–85	-	-		1.3 (1)	2.6 (2)	
Gender	Female	50.0 (23)	59.1 (13)	X^2 (1, 68) = 0.49, p = n.s.	51.9 (40)	51.9 (40)	X^2 (1, 154) = 0.00, p = n.s.
	Male	50.0 (23)	40.9 (9)		48.1 (37)	48.1 (37)	
Region	*London*	41.3 (19)	59.1 (13)	p = n.s.	44.2 (34)	31.2 (24)	p = n.s.
	South-East	4.3 (2)	9.1 (2)		6.5 (5)	2.6 (2)	
	South-West	6.5 (3)	-		5.2 (4)	3.9 (3)	
	East of England	6.5 (3)	4.5 (1)		5.2 (4)	2.6 (2)	
	East Midlands	2.2 (1)	4.5 (1)		3.9 (3)	5.2 (4)	
	West Midlands	6.5 (3)	-		5.2 (4)	2.6 (2)	
	North-East	-	-		-	5.2 (4)	
	North-West	17.4 (8)	9.1 (2)		13.0 (10)	23.4 (18)	
	Yorkshire and the Humber	4.3 (2)	4.5 (1)		3.9 (3)	3.9 (3)	
	Scotland	4.3 (2)	9.1 (2)		7.8 (6)	9.1 (7)	
	Wales	4.3 (2)	-		3.9 (3)	7.8 (6)	
	Northern Ireland	2.2 (1)	-		1.3 (1)	2.6 (2)	
Setting	City/big town	67.4 (31)	77.3 (17)	p = n.s.	67.5 (52)	55.8 (43)	X^2 (2, 154) = 4.68, p = n.s.
	Small town	26.1 (12)	9.1 (2)		22.1 (17)	37.7 (29)	
	Rural area	6.5 (3)	13.6 (3)		10.4 (8)	6.5 (5)	

MEC = Minority ethnic communities. n.s. = not statistically significant. Results of Fisher's exact tests are shown as *p*-values only.

3.2. Eye Health

3.2.1. Eye Conditions

There were few statistically significant differences in the proportions reporting each eye condition (Table 2). Prevalence of keratoconus/corneal dystrophy was significantly higher among MEC (14.3%) than White participants (3.9%), X^2 (1, 154) = 5.03, p = 0.025, Cramer's V = 0.181, making it the most common eye condition in the MEC group, followed by an optic nerve condition (11.7%) and dry AMD, a diabetic eye condition, and glaucoma (9.1%, respectively). In contrast, White participants were more likely than MEC participants to report having V.I. as a result of an injury or accident (10.4% vs. 2.6%), although this did not quite reach statistical significance, X^2 (1, 154) = 3.85, p = 0.050, Cramer's V = 0.158. The most reported eye conditions among White participants were an optic nerve condi-

tion, nystagmus, and V.I. resulting from a stroke, brain tumour, or brain damage (13.0%, respectively), an injury or accident (10.4%), and glaucoma and congenital cataract (9.1%, respectively). Around a quarter of participants from MEC and a third of White participants reported having 'other' eye conditions and one White individual reported not having an eye condition. MEC participants were slightly, but not significantly, more likely to select 'Don't know' when asked what eye condition(s) they had (11.7% vs. 7.8%).

Table 2. Prevalence of eye conditions, by subgroup.

Eye Conditions	Asian (n = 46) % (n)	Black (n = 22) % (n)	Fisher's Exact	MEC (n = 77) % (n)	White (n = 77) % (n)	X^2 (1, N = 154)
Any other condition(s)	17.4 (8)	36.4 (8)	p = n.s.	26.0 (20)	33.8 (26)	1.12, p = n.s.
Keratoconus/corneal dystrophy	19.6 (9)	9.1 (2)	p = n.s.	14.3 (11)	3.9 (3)	5.03, p = 0.025 *
Optic nerve condition (e.g., Leber's amaurosis, atrophy, neuritis)	8.7 (4)	9.1 (2)	p = n.s.	11.7 (9)	13.0 (10)	0.06, p = n.s.
Dry AMD	15.2 (7)	-	p = n.s.	9.1 (7)	6.5 (5)	0.36, p = n.s.
Wet AMD	-	4.5 (1)	p = n.s.	1.3 (1)	2.6 (2)	p = n.s.
AMD/Macular degeneration (unknown)	2.2 (1)	4.5 (1)	p = n.s.	2.6 (2)	2.6 (2)	p = n.s.
Macular degeneration/dystrophy (not age-related)	8.7 (4)	4.5 (1)	p = n.s.	6.5 (5)	5.2 (4)	p = n.s.
Cataract (age-related)	4.3 (2)	9.1 (2)	p = n.s.	5.2 (4)	3.9 (3)	p = n.s.
Cataract (congenital)	6.5 (3)	13.6 (3)	p = n.s.	7.8 (6)	9.1 (7)	0.08, p = n.s.
Glaucoma	6.5 (3)	13.6 (3)	p = n.s.	9.1 (7)	9.1 (7)	0.00, p = n.s.
Nystagmus	6.5 (3)	9.1 (2)	p = n.s.	7.8 (6)	13.0 (10)	1.12, p = n.s.
V.I. due to a stroke, brain tumour, or brain damage	8.7 (4)	4.5 (1)	p = n.s.	7.8 (6)	13.0 (10)	1.12, p = n.s.
Retinitis pigmentosa	10.9 (5)	4.5 (1)	p = n.s.	7.8 (6)	6.5 (5)	0.10, p = n.s.
Detached retina	2.2 (1)	13.6 (3)	p = n.s.	6.5 (5)	5.2 (4)	p = n.s.
Diabetic eye condition (e.g., retinopathy, maculopathy)	6.5 (3)	18.2 (4)	p = n.s.	9.1 (7)	2.6 (2)	p = n.s.
Retinal disease (inherited disease not retinitis pigmentosa)	4.3 (2)	13.6 (3)	p = n.s.	6.5 (5)	2.6 (2)	p = n.s.
Retinopathy of prematurity	-	-	-	-	3.9 (3)	p = n.s.
Cortical V.I.	4.3 (2)	4.5 (1)	p = n.s.	3.9 (3)	2.6 (2)	p = n.s.
Uveitis	-	9.1 (2)	p = n.s.	2.6 (2)	5.2 (4)	p = n.s.
An injury or an accident	2.2 (1)	4.5 (1)	p = n.s.	2.6 (2)	10.4 (8)	p = n.s.
Don't know	13.0 (6)	-	p = n.s.	11.7 (9)	7.8 (6)	0.66, p = n.s.
None	-	-	-	-	1.3 (1)	-

AMD = Age-related macular degeneration, MEC = Minority ethnic communities. n.s. = not statistically significant. * denotes statistically significant results. Results of Fisher's exact tests are shown as p-values only. Due to small sample sizes, Fisher's exact tests only are shown for Asian and Black participants.

Within the MEC group, there were no statistically significant differences in eye conditions between Asians and Black participants. The most common eye conditions among Asian participants were keratoconus/corneal dystrophy (19.6%), 'other' eye conditions (17.4%), and dry AMD (15.2%), while 'other' eye conditions (36.4%), diabetic eye conditions (18.2%), and congenital cataract, detached retina, glaucoma, and retinal disease (13.6%, respectively) were most common among Black participants (Figure 1). Across the whole sample, 30.5% reported more than one eye condition.

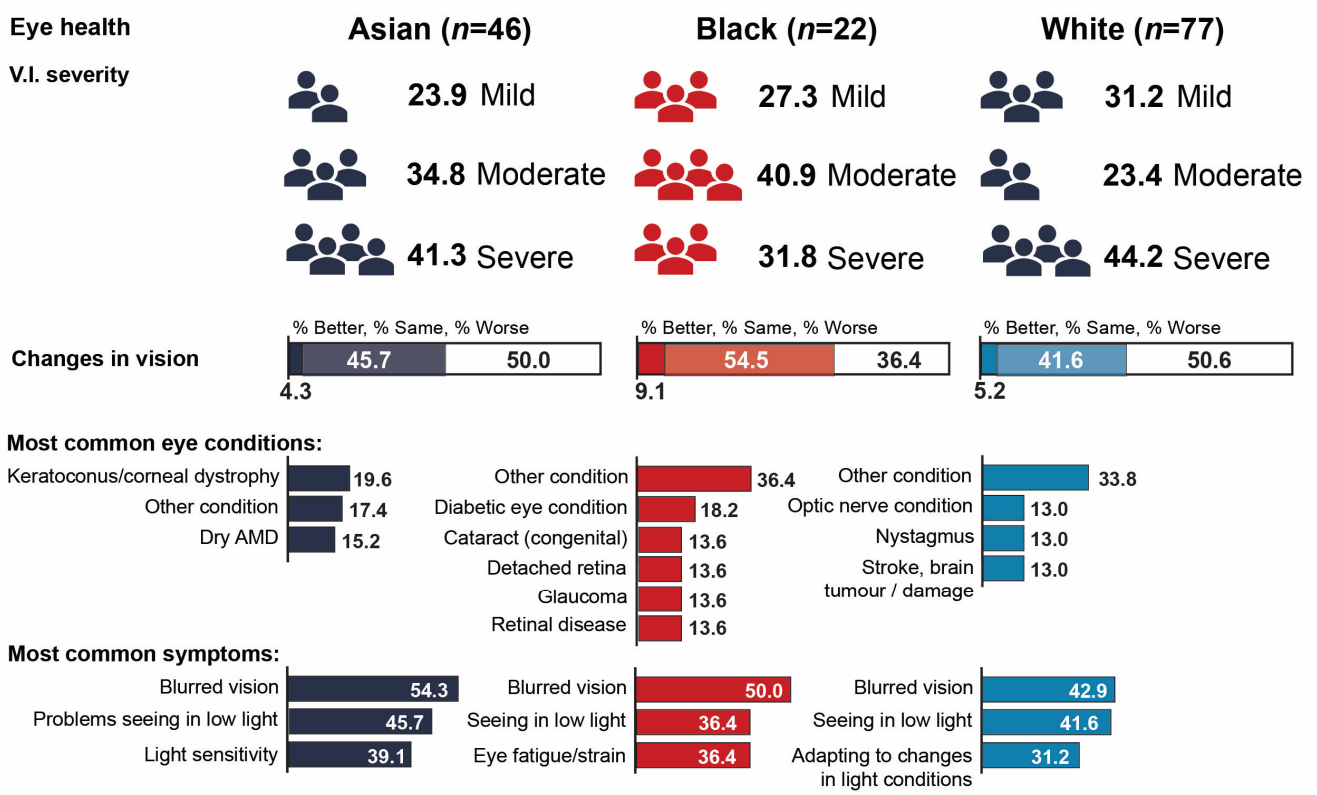

Figure 1. Eye health (severity of V.I., changes in vision, most common eye conditions and symptoms) in Asian, Black, and White participants.

3.2.2. Vision Difficulties

There were no statistically significant differences in the proportions who reported having a list of vision difficulties (Table 3). The most common vision difficulties across all four groups were blurred vision and problems seeing in low lights/night blindness (Figure 1). In addition, 36.4% of MEC and Black participants reported eye strain/fatigue. Among Asian participants, light sensitivity was slightly more prevalent than eye strain/fatigue (39.1% vs. 34.8%), while difficulty adapting to changes in light conditions was the third most common condition among White participants (31.2%). A relatively small proportion in each group reported having no vision at all (MEC: 10.4%, Asian: 8.7%, Black: 4.5%, White: 7.8%). Although relatively rare, prevalence of Charles Bonnet Syndrome was around five times higher among White than MEC participants (6.5% vs. 1.3%).

Table 3. Prevalence of vision difficulties, by subgroup.

Vision Difficulties	Asian (n = 46) % (n)	Black (n = 22) % (n)	X^2 (1, N = 68)	MEC (n = 77) % (n)	White (n = 77) % (n)	X^2 (1, N = 154)
No vision at all	8.7 (4)	4.5 (1)	p = n.s.	10.4 (8)	7.8 (6)	0.31, p = n.s.
Blurred vision	54.3 (25)	50.0 (11)	0.11, p = n.s.	53.2 (41)	42.9 (33)	1.66, p = n.s.
Problems seeing in low lights/night blindness	45.7 (21)	36.4 (8)	0.52, p = n.s.	39.0 (30)	41.6 (32)	0.11, p = n.s.
Eye fatigue/eye strain	34.8 (16)	36.4 (8)	0.02, p = n.s.	36.4 (28)	29.9 (23)	0.73, p = n.s.
Light sensitivity (unable to cope with normal room light levels)	39.1 (18)	31.8 (7)	0.34, p = n.s.	33.8 (26)	23.4 (18)	2.04, p = n.s.

Table 3. *Cont.*

Vision Difficulties	Asian (*n* = 46) % (*n*)	Black (*n* = 22) % (*n*)	X^2 (1, *N* = 68)	MEC (*n* = 77) % (*n*)	White (*n* = 77) % (*n*)	X^2 (1, *N* = 154)
Peripheral field loss/tunnel vision	30.4 (14)	31.8 (7)	0.01, *p* = n.s.	29.9 (23)	24.7 (19)	0.52, *p* = n.s.
Difficulty adapting to changes in light conditions	32.6 (15)	31.8 (7)	0.00, *p* = n.s.	29.9 (23)	31.2 (24)	0.03, *p* = n.s.
Floaters	21.7 (10)	18.2 (4)	*p* = n.s.	20.8 (16)	28.6 (22)	1.26, *p* = n.s.
Redness, swelling, or tearing	23.9 (11)	18.2 (4)	*p* = n.s.	20.8 (16)	11.7 (9)	2.34, *p* = n.s.
Difficulty processing vision	19.6 (9)	18.2 (4)	*p* = n.s.	19.5 (15)	27.3 (21)	1.31, *p* = 0.25 *
Central field loss/distortion or patches missing in the middle	21.7 (10)	9.1 (2)	*p* = n.s.	15.6 (12)	18.2 (14)	0.19, *p* = n.s.
Flashing lights	13.0 (6)	4.5 (1)	*p* = n.s.	10.4 (8)	11.7 (9)	0.07, *p* = n.s.
Halos around lights	8.7 (4)	4.5 (1)	*p* = n.s.	9.1 (7)	16.9 (13)	2.07, *p* = n.s.
Any other issues	4.3 (2)	4.5 (1)	*p* = n.s.	3.9 (3)	9.1 (7)	1.71, *p* = n.s.
Half field loss in both eyes (hemianopia)	4.3 (2)	-	*p* = n.s.	2.6 (2)	7.8 (6)	*p* = n.s.
CBS/Hallucinations	-	-	-	1.3 (1)	6.5 (5)	*p* = n.s.

CBS = Charles Bonnet syndrome, MEC = Minority ethnic communities. n.s. = not statistically significant. * denotes statistically significant results. Results of Fisher's exact tests are shown as *p*-values only.

3.2.3. V.I. Severity and Changes in Vision

There were no statistically significant differences in V.I. severity and changes in vision between MEC and White, nor between Asian and Black, participants (Table 4).

Table 4. Vision severity and changes in vision, by subgroup.

		Asian (*n* = 46) % (*n*)	Black (*n* = 22) % (*n*)	MEC (*n* = 77) % (*n*)	White (*n* = 77) % (*n*)
V.I. severity		*U* = 552.5, *p* = n.s.		*U* = 2951, *p* = n.s.	
	Severe	41.3 (19)	31.8 (7)	39.0 (30)	44.2 (34)
	Moderate	34.8 (16)	40.9 (9)	35.1 (27)	23.4 (18)
	Mild	23.9 (11)	27.3 (6)	26.0 (20)	31.2 (24)
	Could not be classified	-	-	-	1.3 (1)
Vision changes		Fisher's exact *p* = n.s.		Fisher's exact *p* = n.s.	
	Improved	4.3 (2)	9.1 (2)	5.2 (4)	5.2 (4)
	Deteriorated	50.0 (23)	36.4 (8)	46.8 (36)	50.6 (39)
	Stayed the same	45.7 (21)	54.5 (12)	48.1 (37)	41.6 (32)
	Other	-	-	-	2.6 (2)

MEC = Minority ethnic communities. n.s. = not statistically significant.

A majority of MEC and White participants were categorised as having severe V.I. (39.0% vs. 44.2%). This was followed by moderate V.I. among MEC (35.2%) and mild V.I. among White participants (31.2%). One White individual could not be classified. Similar proportions of MEC participants reported that their vision had deteriorated (46.8%) or stayed the same (48.1%). Deteriorations in vision were slightly more prevalent among White participants (50.6%), with a lower proportion reporting that their vision had stayed the same (41.6%).

Within the MEC group, Asian participants were predominantly categorised as having severe V.I. (41.3%) followed by moderate V.I. (34.8%). In contrast, a majority of Black partic-

ipants were categorised as having moderate V.I. (40.9%) followed by severe V.I. (31.8%). Although not statistically significant, there were further differences in vision changes. Half of Asian participants reported a deterioration in their vision (50.0%) compared to only around a third of Black participants (36.4%) (Figure 1). Among the latter, over half reported that their vision had stayed the same and just under one in 10 reported an improvement in their vision.

3.3. General Health

There were no statistically significant differences in self-reported general health between MEC and White (U = 3324.5, p = n.s.), nor between Asian and Black participants (U = 522.5, p = n.s.). Overall, a majority of participants across all groups rated their health to be Good or Very Good.

White participants were around twice as likely as MEC participants to report very good health (26.0% vs. 18.2%), but equal proportions in both groups reported good health (41.6%). In contrast, MEC participants were 1.6 times more likely than White participants to report bad health (10.4 vs. 6.5%) and twice as likely to report very bad health (2.6% vs. 1.3%).

None of the Asian or Black participants reported very bad health. Across all groups, Black participants were least likely to report good/very good health (59.1%), including very good health (13.6%). But they were also least likely to report poor health (4.5%). Although a comparatively higher proportion of Asian participants reported good/very good health (63.1%), including very good health (19.6%), participants in this group were most likely to report bad health (13.0%) (Figure 2).

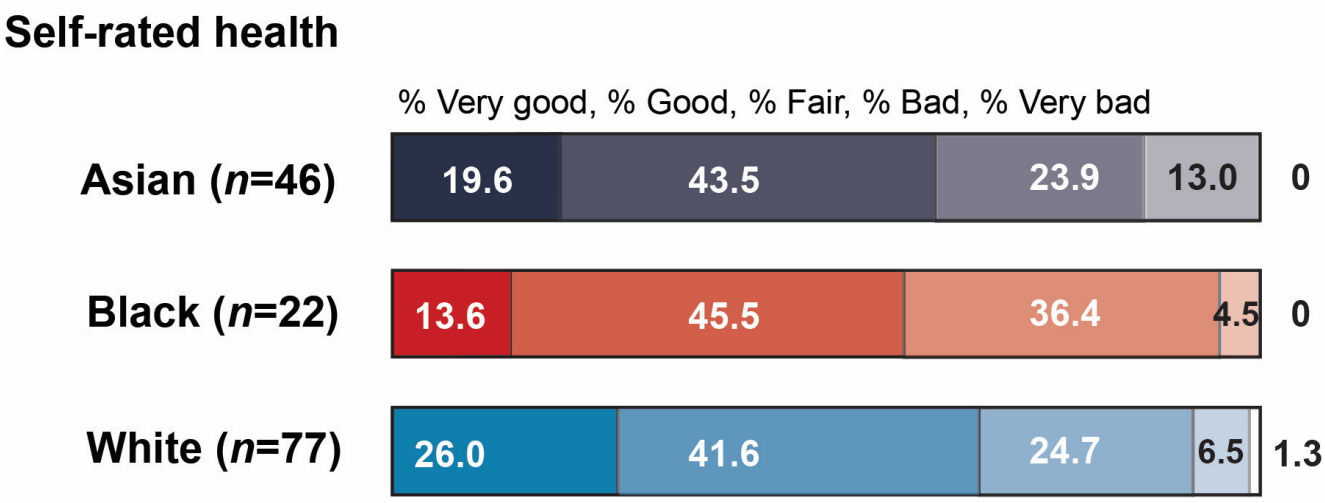

Figure 2. Self-reported general health in Asian, Black, and White participants from Very good to Very bad.

3.4. Comorbidities

Tables 5–8 and Figure 3 provide an overview of comorbid conditions other than V.I. among MEC, including Asian and Black, and White participants. Participants across all groups reported an average of two comorbid conditions (MEC: M = 2.4, Asian: M = 2.2, Black: M = 2.3, White: M = 2.0), most commonly physical health conditions and impairments.

Table 5. Prevalence of comorbidities by number and domain, by subgroup.

	Asian (*n* = 46) % (*n*)	**Black (*n* = 22) % (*n*)**	**MEC (*n* = 77) % (*n*)**	**White (*n* = 77) % (*n*)**
No comorbid conditions	30.4 (14)	9.1 (2)	22.1 (17)	23.4 (18)
Has any comorbid conditions	69.6 (32)	90.9 (20)	77.9 (60)	76.6 (59)
From one comorbidity domain	23.9 (11)	36.4 (8)	26.0 (20)	32.5 (25)
From two comorbidity domains	15.2 (7)	36.4 (8)	24.7 (19)	27.3 (21)
From three comorbidity domains	23.9 (11)	18.2 (4)	23.4 (18)	14.3 (11)
From four comorbidity domains	6.5 (3)	-	3.9 (3)	2.6 (2)
Has any physical comorbidities	50.0 (23)	72.7 (16)	61.0 (47)	51.9 (40)
Has any neurodevelopmental comorbidities	19.6 (9)	9.1 (2)	14.3 (11)	14.3 (11)
Has any mental health comorbidities	37.0 (17)	27.3 (6)	35.1 (27)	35.1 (27)
Has comorbid impairments	47.8 (22)	54.5 (12)	51.9 (40)	41.6 (32)

Table 6. Prevalence of self-reported comorbid physical health conditions, by subgroup.

Physical Health Conditions	**Asian (*n* = 46) % (*n*)**	**Black (*n* = 22) % (*n*)**	**Fisher's Exact**	**MEC (*n* = 77) % (*n*)**	**White (*n* = 77) % (*n*)**	**X^2 (1, *N* = 154)**
No health conditions	50.0 (23)	27.3 (6)	*p* = n.s.	39.0 (30)	48.1 (37)	1.29, *p* = n.s.
Diabetes	13.0 (6)	27.3 (6)	*p* = n.s.	16.9 (13)	6.5 (5)	4.03, *p* = 0.045 *
Asthma or allergies	8.7 (4)	18.2 (4)	*p* = n.s.	13.0 (10)	18.2 (14)	0.79, *p* = n.s.
Arthritis	13.0 (6)	9.1 (2)	*p* = n.s.	10.4 (8)	10.4 (8)	0.00, *p* = n.s.
High blood pressure	8.7 (4)	4.5 (1)	*p* = n.s.	7.8 (6)	7.8 (6)	0.00, *p* = n.s.
Auto-immune conditions	2.2 (1)	4.5 (1)	*p* = n.s.	6.5 (5)	3.9 (3)	*p* = n.s.
Migraines	-	9.1 (2)	*p* = n.s.	3.9 (3)	3.9 (3)	*p* = n.s.
Registered disabilities (other than V.I.)	-	9.1 (2)	*p* = n.s.	2.6 (2)	1.3 (1)	*p* = n.s.
Epilepsy	2.2 (1)	-	*p* = n.s.	2.6 (2)	2.6 (2)	*p* = n.s.
Kidney problem or disease	-	4.5 (1)	*p* = n.s.	1.3 (1)	2.6 (2)	*p* = n.s.
Multiple Sclerosis	-	-	-	1.3 (1)	-	*p* = n.s.
Heart condition or disease	2.2 (1)	-	*p* = n.s.	1.3 (1)	5.2 (4)	*p* = n.s.
Stroke	-	4.5 (1)	*p* = n.s.	1.3 (1)	-	*p* = n.s.
Cancer	-	-	-	-	1.3 (1)	*p* = n.s.
Alzheimer's/dementia	-	-	-	-	-	-
Parkinson's disease	-	-	-	-	-	-
Other	19.6 (9)	31.8 (7)	*p* = n.s.	27.3 (21)	19.5 (15)	1.31, *p* = n.s.

MEC = Minority ethnic communities. n.s. = not statistically significant. * denotes statistically significant results. Results of Fisher's exact tests are shown as *p*-values only. Due to small sample sizes, Fisher's exact tests only are shown for Asian and Black participants.

Table 7. Prevalence of self-reported comorbid neurodevelopmental and mental health conditions, by sub-group.

Neurodevelopmental Conditions	**Asian (*n* = 46) % (*n*)**	**Black (*n* = 22) % (*n*)**	**Fisher's Exact**	**MEC (*n* = 77) % (*n*)**	**White (*n* = 77) % (*n*)**	**Fisher's Exact**
No conditions	80.4 (37)	90.9 (20)	*p* = n.s.	85.7 (66)	85.7 (66)	*p* = n.s.
Other	4.3 (2)	9.1 (2)	*p* = n.s.	5.2 (4)	-	*p* = n.s.
Dyslexia	6.5 (3)	-	*p* = n.s.	3.9 (3)	7.8 (6)	*p* = n.s.
Down's Syndrome	2.2 (1)	-	*p* = n.s.	1.3 (1)	-	*p* = n.s.
Autism	2.2 (1)	-	*p* = n.s.	1.3 (1)	3.9 (3)	*p* = n.s.
ADHD	2.2 (1)	-	*p* = n.s.	1.3 (1)	1.3 (1)	*p* = n.s.
Mental Health Conditions			**X^2 (1, *N* = 68)**			**X^2 (1, *N* = 154)**
Recently experienced emotional, psychological, or mental ill-health conditions	37.0 (17)	27.3 (6)	0.62, *p* = n.s.	35.1 (27)	35.1 (27)	0.00, *p* = n.s.

MEC = Minority ethnic communities. n.s. = not statistically significant. Results of Fisher's exact tests are shown as *p*-values only.

Table 8. Prevalence of self-reported comorbid impairments, by subgroup.

Comorbid Impairments	Asian (n = 46) % (n)	Black (n = 22) % (n)	Fisher's Exact	MEC (n = 77) % (n)	White (n = 77) % (n)	X^2 (1, N = 154)
No difficulties	52.2 (24)	45.5 (10)	p = n.s.	48.1 (37)	58.4 (45)	1.67, p = n.s.
Mobility difficulties (e.g., moving about, climbing stairs, or use wheelchairs or crutches to help you be mobile)	28.3 (13)	45.5 (10)	p = n.s.	36.4 (28)	19.5 (15)	5.45, p = 0.020 *
Difficulty remembering things or periods of confusion	26.1 (12)	4.5 (1)	p = 0.047 *	22.1 (17)	18.2 (14)	0.36, p = n.s.
Dexterity difficulties (e.g., grasping or holding objects)	15.2 (7)	4.5 (1)	p = n.s.	15.6 (12)	16.9 (13)	0.05, p = n.s.
Difficulty hearing or use a hearing aid	15.2 (7)	13.6 (3)	p = n.s.	14.3 (11)	13.0 (10)	0.06, p = n.s.
Difficulty speaking or making yourself understood	8.7 (4)	-	p = n.s.	6.5 (5)	2.6 (2)	p = n.s.

MEC = Minority ethnic communities. n.s. = not statistically significant. * denotes statistically significant results. Results of Fisher's exact tests are shown as p-values only. Due to small sample sizes, Fisher's exact tests only are shown for Asian and Black participants.

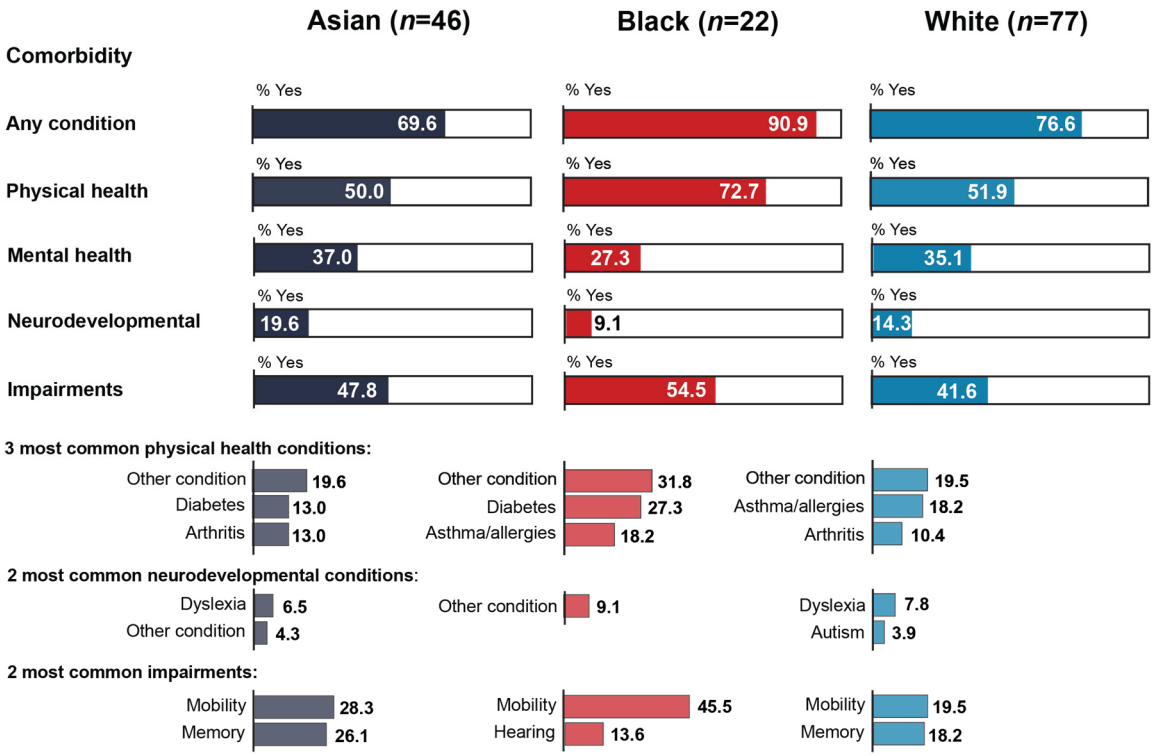

Figure 3. Reported comorbidities in Asian, Black, and White participants, including percentages per domain and most commonly reported conditions per domain.

Similar proportions of White and MEC participants reported comorbid conditions (76.6% vs. 77.9%, respectively). The latter were more likely to report comorbid conditions from three or four different domains and to report comorbid physical health conditions and other impairments than White participants (Table 5).

Although Black participants were more likely than Asian participants to report comorbid conditions (90.9% vs. 69.6%, respectively), these tended to be from one or two domains. Almost three-quarters (72.7%) of Black participants reported physical comorbidities, and over half (54.5%) reported comorbid impairments compared to around half of Asian participants (50.0% and 47.8%, respectively). In contrast, Asian participants were more likely than any other group to report mental health and neurodevelopmental comorbidities.

3.4.1. Physical Health Conditions

There were no statistically significant associations between ethnicity and any of the physical health conditions, except for diabetes. Diabetes was significantly more common among MEC (16.9%) than White participants (6.5%), X^2 (1, 154) = 4.03, p = 0.045, Cramer's V = 0.162 (Table 6). In addition to 'other' conditions, the most common physical health conditions among MEC participants were diabetes (16.9%), asthma/allergies (13.0%), and arthritis (10.4%), while asthma/allergies (18.2%), arthritis (10.4%), and high blood pressure (7.8%) were most common among White participants.

Almost half of the Asian subgroup (50.0%) reported having no comorbid physical conditions compared to just over a quarter of Black participants (27.3%), but this did not reach statistical significance (p = 0.116). Arthritis and diabetes (13.0%, respectively), asthma/allergies, and high blood pressure (8.7%, respectively) were the most common physical health conditions among Asian participants, while diabetes (27.3%) and asthma/allergies (18.2%) were most common among Black participants.

Cancer, multiple sclerosis, kidney conditions, stroke, and heart conditions were less common, and none of the participants reported having Alzheimer's or Parkinson's.

3.4.2. Neurodevelopmental and Mental Health Conditions

There were no significant differences between the groups in the prevalence of neurodevelopmental conditions, nor for recently experienced emotional, psychological, or mental ill-health conditions (Table 7).

At least eight in 10 participants across all groups did not report any neurodevelopmental conditions. In addition to 'other' (n = 4, 5.2%), dyslexia was the most common neurodevelopmental condition among MEC participants (n = 3, 3.9%). Dyslexia was also the most common condition among White participants (n = 6, 7.8%) followed by autism (n = 3, 3.9%), and ADHD (n = 1, 1.3%). Equal proportions of MEC and White participants (35.1%) reported recent mental health difficulties.

Within the MEC group, only two Black participants (9.1%) reported having some neurodevelopmental conditions, both selecting 'other'. Neurodevelopmental conditions including dyslexia (n = 3, 6.5%), Down's syndrome, autism, and ADHD (n = 1, 2.2%, respectively), and 'other' neurodevelopmental conditions (n = 2, 4.3%) were slightly more common among Asian participants. Asian participants were also more likely to report mental health difficulties than Black participants (37.0 vs. 27.3%).

3.4.3. Comorbid Impairments

There were few statistically significant differences in comorbid impairments between the groups (Table 8), with around half of participants in all groups stating that they had no comorbid impairments. White participants were most likely (58.4%) and Black participants least likely (45.5%) to have no comorbid impairments.

Almost twice as many MEC participants reported difficulties with mobility compared to White participants, 36.4% vs. 19.5%, X^2 (1, 154) = 5.45, p = 0.020, Cramer's V = 0.188. This was largely driven by mobility difficulties within the Black group where 45.5% reported mobility issues compared to 28.3% of Asian participants, although this difference was not statistically significant (p = 0.181). In contrast, Asian participants were just under six times more likely to report memory difficulties than Black participants, 26.1% vs. 4.5%, p = 0.047. A greater proportion of Asian than Black or White participants reported having all impairments, except for dexterity difficulties (e.g., grasping or holding objects) which were slightly more prevalent among White participants.

3.5. Physical Exercise

Most participants across all groups were able to take part in exercise to some extent, and most did more than an hour of exercise per week (Table 9).

Table 9. Participants' self-reported perception of level of physical exercise.

Physical Exercise	Asian (*n* = 46) % (*n*)	Black (*n* = 22) % (*n*)	MEC (*n* = 77) % (*n*)	White (*n* = 77) % (*n*)
	Fisher's exact p = n.s.		Fisher's exact p = n.s.	
Able to take part as much as I'd like	34.8 (16)	50.0 (11)	36.4 (28)	50.6 (39)
Able to take part but not as much as I'd like	37.0 (17)	31.8 (7)	36.4 (28)	33.8 (26)
Not able to take part but would like to	26.1 (12)	18.2 (4)	24.7 (19)	11.7 (9)
Don't want to take part	2.2 (1)	-	2.6 (2)	3.9 (3)

MEC = Minority ethnic communities. n.s. = not statistically significant.

While there was no statistically significant difference between MEC and White participants in terms of their perceived ability to take part in physical exercise (p = 0.125), there was a significant difference in the amount of exercise they were doing, U = 3490.5, p = 0.036. Almost two-thirds (63.6%) of White participants reported doing over 1 h of exercise per week, compared to under half of MEC participants (46.8%). A greater proportion of MEC participants did no exercise at all (14.3% vs. 9.1%), or only 30 min or less (13.0% vs. 7.8%).

Within the MEC group, there was no statistically significant difference in the perceived ability to exercise (p = 0.710), nor in the amount of exercise (U = 396.0, p = 0.121), despite a comparatively greater proportion of Black participants reporting that they were able to exercise as much as they wanted (50.0% vs. 34.8%) and exercising for over an hour per week (63.6% vs. 41.3%). Asian participants were slightly more likely to do no exercise at all (13.0% vs. 9.1%), but just under a third did 30 min to 1 h (Figure 4).

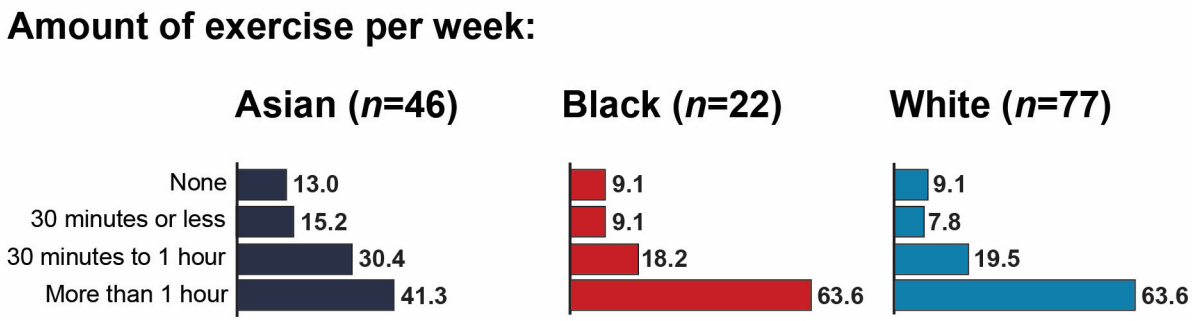

Figure 4. Self-reported amount of exercise per week in Asian, Black, and White participants.

4. Discussion

Limited research has considered comorbidities in people living with V.I. who are from different ethnic groups. This article provides a snapshot of eye health, comorbidities, and participation in exercise in a sample of MEC adults, including those from Asian and Black communities, living with V.I. in the UK, relative to a matched control sample of White adults. Overall, there were few statistically significant differences between White and MEC participants, and even fewer between Asian and Black participants. The latter may be due to a lack of statistical power due to small subsample sizes within these groups.

4.1. Eye Conditions and Vision Difficulties

Blurred vision and problems seeing in low lights/night blindness were the most common vision difficulties across all groups. Although higher than the prevalence of 4% reported for a representative sample of 958 UK adults with V.I. [56], a relatively small proportion of participants across all groups reported having no vision at all (ranging from 4.5% among Black to 10.4% among MEC participants). This is of note because the general public tends to equate V.I. with no vision at all, which can have a negative impact on

people with partial sight and their sense of identity as a 'blind person' [57,58]. Interestingly, eight participants (two Asian, two Black, and four White participants) reported that their vision had improved recently. These participants reported having congenital cataract, detached retina, glaucoma, uveitis, an optic nerve condition, and/or keratoconus. Some of these conditions may indeed be treatable (e.g., with cataract or retinal detachment surgery) [59,60], while treatments for others may slow but not reverse sight loss (e.g., eye drops for glaucoma) [61]. Participants were not asked whether they had been receiving any treatment for their eye conditions. It is therefore not clear if treatment contributed to these self-reported improvements. Furthermore, it is not clear which aspects of vision improved. The same applies to self-reported deteriorations in vision. Around half of Asian, White, and MEC participants had experienced a deterioration in their vision compared to just over a third of Black participants. Deterioration in vision may be caused by a range of factors, such as delays to receiving treatment, ineffective treatment, or progression of disease, the rates of which will differ between individuals and eye conditions.

Excluding 'other' eye conditions, the most common eye conditions in this sample were diabetic eye conditions among Black participants, keratoconus/corneal dystrophy among Asian participants, and optic nerve conditions among White participants. Elsewhere, cataracts have been identified as a leading cause of age-related sight loss [62]. Research with a representative sample of 1007 UK adults with V.I. found that, in addition to 'other' conditions, the most common eye conditions were retinitis pigmentosa (12%) and glaucoma (10%) among working-age adults (aged 18–64), and macular degeneration (59%) and glaucoma (20%) among retired adults (aged 65+) [56]. Considering the relatively young age of the current sample, we would therefore expect a higher prevalence of conditions such as retinitis pigmentosa and glaucoma, and a lower prevalence of age-related conditions such as AMD and age-related cataracts.

There is evidence of ethnic differences in the prevalence of certain eye conditions. For instance, Afro-Caribbean communities have been found to be at increased risk of primary open-angle glaucoma [63,64]. Prevalence of glaucoma in this sample was slightly higher among Black than White participants and around twice as likely as among Asian participants (13.6% vs. 9.1% vs. 6.5%). The latter have been found to be at increased risk and, crucially, earlier onset of cataract [65]. But prevalence of age-related and congenital cataracts was also highest among Black participants in this sample, while the proportions of Asian and White participants reporting age-related (4.3% vs. 3.9%) and congenital cataracts (6.5% vs. 9.1%) were relatively similar. Both Afro-Caribbean and Asian, including Indian, Bangladeshi, and Pakistani, communities have been found to be at increased risk of diabetic retinopathy (DR) [18,66], including sight-threatening DR. The V.I. Lives survey did not differentiate between specific diabetes-related eye conditions. It is therefore not possible to comment on the prevalence of DR specifically, but Asian participants in this sample were 2.5 times more likely than White participants to report having a diabetic eye condition (6.5% vs. 2.6%), while Black participants (18.2%) were almost three times more likely than Asian participants and seven times more likely than White participants to have a diabetic eye condition. Noteworthy is the fact that the number of participants reporting diabetes-related eye conditions is greater than the number of people reporting diabetes—indicating a possible error in data collection.

4.2. Comorbidities

Comorbidity, particularly of physical health conditions, was relatively high among all groups. Diabetes, arthritis, and asthma/allergies were the most common conditions reported across the groups (in addition to 'other'). Providing support for prior research which found a higher prevalence of diabetes among people of Asian and Afro-Caribbean descent [25–29], diabetes was the most common physical health condition among Black (27.3%, following 'other') and Asian (13.0%, together with arthritis), but not White participants. Indeed, there was a statistically significant difference in the prevalence of diabetes between MEC and WC participants in this sample. Asian participants were around twice as likely

and Black participants were around four times more likely to have diabetes than White participants. Although studies have shown a slightly greater prevalence of T2DM in Asian compared to Afro-Caribbean individuals [25,67,68], the proportion of Black participants reporting diabetes was around twice that of Asian participants, but this was not statistically significant. Research has largely focused on ethnic group differences in T2DM [29,67,68]. However, the V.I. Lives Survey did not ask participants to specify the type of diabetes they had, nor did it explore possible factors such as their migration history. Both would be useful to include in future research. A lower prevalence of diabetes has been found in second- compared to first-generation migrants [67,69], suggesting that migration may play a role in the prevalence of diabetes [67,69] as well as asthma/allergies [70]. Existing research found a higher prevalence of allergies/asthma among MEC than White communities [70,71]. In the current sample, Black and White participants were more than twice as likely to report asthma/allergies than Asian participants (18.2%, respectively, vs. 8.7%). Prior research found that rates of asthma/allergies in South Asian communities in the UK were generally comparable or even greater than for Afro-Caribbean communities [70,71], but there may be some underreporting of allergies in South Asian communities due to barriers such as stigma or denial [71].

In addition, over a quarter of Black participants and over a third of Asian and White participants in this sample reported that they had recently experienced emotional, psychological, or mental ill-health conditions. This is higher than the prevalence of mental health disorders in the general population, where 22.5% of Black, 17.9% of Asian, 17.3% of White British, and 14.4% of White other adults had experienced a common mental disorder in the past week [72]. A higher prevalence of mental health conditions may be expected considering the association between V.I. and poorer mental health outcomes, including depression and anxiety [2,4–6], as well the higher rates of mental health conditions amongst young and working-aged people in general [73]. In contrast to general population figures, mental well-being as assessed by the short Edinburgh-Mental Well-being scale (SWEMWBS) was also significantly better in Black than Asian participants in this sample [41]. It is not clear if this reflects better mental health or underreporting among Black participants in this sample.

The prevalence of neurodevelopmental conditions was also lower among Black (9.1%) than White (14.3%) and Asian participants (17.4%). Around 10% of the UK population is reported to have dyslexia [74], while 3–4% are estimated to have ADHD [75] and 1.1% autism [76]. Prevalence among different ethnic communities is not available. In this sample, the prevalence of autism is just slightly higher among Asian and White participants, but the prevalence of ADHD and dyslexia is slightly lower across all groups than in the general population. These differences are very small and may reflect the small sample size and composition rather than underreporting. However, personal as well as communal cultural and religious beliefs and different linguistic backgrounds shape attitudes and perception of disabilities [69,77–79]. Additionally, neurodevelopmental and mental health disorders may be deemed to be more associated with both enacted and internalised stigma [80,81] and therefore result in underreporting of these conditions. Having a physical disability in addition to a mental illness has been associated with increased levels of stigma compared to those with only mental illness [82].

Finally, half of participants across all groups reported a comorbid impairment, most commonly mobility difficulties. Just under half of Black participants reported having mobility difficulties compared to around one in four Asian and around one in five White participants. In addition, over a quarter of Asian participants reported memory issues/confusion. Studies have previously reported a link between poor visual function and worse memory, although this is often seen in populations of older adults [83,84]. A decline in verbal episodic and working memory has also been identified in women with moderate or severe V.I. as they transition from middle to older age [83,84]. In the present sample, 44% of those aged 60+ years reported having memory difficulties compared to 20% of those aged 18–59 years. It is therefore unclear if memory impairment relates to age, ethnicity, or V.I. in

this sample. In addition, 15.6% of MEC and 16.9% of White participants (but only 4.5% of Black participants) reported dexterity issues. Some dexterity issues may be expected, as central vision loss has been associated with reduced hand coordination and an increase in time needed for manipulation and precise placement of objects [85], although it is not clear to what extent the difficulties reported in this sample are related to their V.I. For instance, mobility difficulties may be attributable to comorbid physical impairments which impact on mobility, or they may relate to difficulties arising from V.I. The ambiguity of the relevant survey question may have led to multiple interpretations of the question. Mobility impairment is the most frequently reported impairment (46%) in the UK population among people living with disabilities [86], but there may be age and ethnic group differences in the prevalence of these. Swenor et al. [87] found that 56% of participants with V.I. aged 60+ years had mobility difficulties, compared to 28% of those aged 18–59 years. Elsewhere, a higher prevalence of locomotor dysfunction has been identified in Indian Asian (46%) and African Caribbean (49%) than White participants (31%) based on performance-based measures [88]. The prevalence of mobility issues in this sample may be unsurprising given the mobility-related challenges faced by people living with V.I. [35,36].

MEC participants were significantly more likely to have mobility issues than White participants, and exercise data showed that they were more likely to exercise for less than an hour, while White participants were more likely to exercise for longer than an hour per week. Mobility difficulties may make it more difficult to participate in longer periods of exercise or more frequent exercise for MEC, although a large proportion of Black participants reported doing over an hour of exercise despite a high prevalence of mobility issues in this group. Presence of comorbidities in addition to a lack of tailored support, motivation, and accessible transport have been identified as barriers to participation in exercise among those with V.I. [40]. Additional barriers to exercise in MEC communities include not having enough free time as a result of working extra-long hours to meet familial demands; language barriers reducing access to public spaces; lack of understanding of the health-related benefits; lack of engagement in specific religious groups due to beliefs surrounding religious restrictions or fatalism; financial implications of taking part in classes or joining a gym; and lack of culturally appropriate spaces [89]. Overlapping factors may be contributing to the lower amount of time spent exercising among MEC participants in this study. One hour of exercise is below recommendations of 150 min of vigorous exercise per week [90]. However, the V.I. Lives Survey did not ask about the intensity of exercise that they were doing, and it is therefore not possible to gauge if participants were doing the optimum level of activity.

Overall, this study identified few statistically significant differences between MEC and White participants, and even fewer between Asian and Black participants. Despite the relatively young age, comorbidity, particularly of physical health conditions, was high: nine in ten Black participants, over two-thirds of Asian and over three-quarters of White participants reported a comorbid condition. Due to small sample sizes, it was not possible to compare health status across different age groups, and this should be addressed in future research. Mental health difficulties constituted the most common comorbid condition among Asian and White participants, whilst Black participants most commonly reported mobility difficulties. Although prevalence of comorbidity was highest among Black participants, these tended to be from one or two domains. In contrast, prevalence of comorbidity was lowest among Asian participants, but this group tended to have comorbid conditions from three to four different domains and a higher prevalence of neurodevelopmental (19.6%) and mental health conditions (37.0%) than in any other group, suggesting more complex support needs. Moreover, compared to White and Black participants, a greater proportion of Asian participants self-reported not doing any exercise at all, having bad health, arthritis, high blood pressure, dyslexia, recent emotional, psychological, or mental health conditions, autism, as well as dexterity, hearing, and communication difficulties. Despite the prevalence of, in many cases, multiple comorbidities, self-reported health was relatively good across all groups. Over half of Black and three in five Asian participants

rated their own health as good or very good. The latter were more likely to rate their health as bad (13.0% vs. 4.5%). Further research will need to confirm these findings in a larger, representative sample and among a wider range of ethnic communities.

Although this study provides preliminary insights into the experiences of diverse communities which are routinely grouped as MEC or BAME, the Asian group, for example, in itself contains people from diverse communities (e.g., Pakistani, Bangladeshi, Indian, Hindus, Muslims, Sikhs, Christians, etc.) [91]. There is therefore a need to explore experiences within more granular ethnic groups, such as Bangladeshi, Pakistani, Indian, instead of South Asian communities.

4.3. Limitations

There were a number of limitations to this study. Firstly, all responses are based on self-reporting rather than objective measures. Classifications of vision severity were determined by the interviewer on a case-by-case basis. This may introduce bias and inaccuracy, and impact on replicability of severity results. The study would have benefitted from larger sample sizes to allow for more in-depth subgroup analysis. For instance, it was not possible to explore the impact of age, V.I. severity, or changes in vision on aspects such as self-rated health or exercise participation within each community. This will need to be explored in future research with a larger sample. The sample was also limited to English speakers, thus excluding some members from these communities. The subgroups in the MEC group were particularly limited in size, with over twice as many Asian participants than Black participants. The differences between these two groups therefore cannot be extrapolated to the wider MEC population, and larger, more even sample sizes are required to produce any meaningful conclusions. Some of the questions asked may have been structured better. For example, when enquiring about changes in vision, the period of time to consider was not specified. It is therefore not known if participants were considering changes over a few weeks, months, or years. Similarly, instead of asking about specific conditions, participants were asked if they had recently experienced any emotional, psychological, and mental health conditions. While this does not provide any insights into the prevalence of individual conditions, this variable was nevertheless included in the analysis to obtain an indication of the prevalence of comorbid mental health difficulties. The survey would have further benefitted from a number of additional questions. For instance, participants were not asked about the intensity of exercise they were doing. To gauge whether participants were doing the optimum level of activity, information about the amount of exercise per week as well as the type of exercise they were engaging in is required. Health can be dependent on a myriad of interplaying factors and the survey would have further benefitted from additional lifestyle questions, e.g., about alcohol use and diet. In addition, socioeconomic factors and deprivation need to be taken into account, because even within the MEC groups there are subgroups that are more disadvantaged in the UK, e.g., Bangladeshis and Pakistanis [92], and such factors are contributors to health inequalities in the UK [93]. Financial status in this sample has been explored elsewhere in this series, and further research may explore any associations between finance and health in these groups. Finally, there were a few participants in this study who stated that they had a diabetes-related eye condition, but the number of people who reported having diabetes was lower, i.e., there may have been errors in data collection.

5. Conclusions

This article provides an insight into health status and comorbidities among a relatively young sample of UK adults with V.I. from minority ethnic communities, thus contributing to research on ethnic health disparities in people living with V.I. While there were few statistically significant differences between MEC and White participants, and between Asian and Black participants, Asian participants in this sample tended to do more poorly on a number of indicators. Although Black participants were more likely to report comorbidity, in particular physical conditions and mobility difficulties, Asian participants were more

likely to report not doing any exercise at all, having bad health, arthritis, high blood pressure, dyslexia, autism, as well as dexterity, hearing, and communication difficulties, as well as recent emotional, psychological, or mental health difficulties.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/disabilities4010006/s1, Figure S1: Flowchart of process for categorising V.I. severity.

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Conflicts of Interest: Authors S.F.H., N.H. and R.S.M.G are employed by BRAVO VICTOR. The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. While the funder was involved in the original data collection, they were not involved in the design of the current study, data analysis, interpretation of data, the writing of this article, or the decision to submit it for publication.

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