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**Link to publisher's version:** <http://dx.doi.org/10.1111/opo.12299>

**Citation:** Armstrong D, Charlesworth E, Alderson AJ and Elliott DB (2016) Is there a link between dizziness and vision? A systematic review. *Ophthalmic and Physiological Optics*. 36(4): 477-486.

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# Is there a link between dizziness and vision? A systematic review

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**Citation information:** Armstrong D, Charlesworth E, Alderson AJ & Elliott DB. Is there a link between dizziness and vision? A systematic review. *Ophthalmic Physiol Opt* 2016; 36: 477–486. doi: 10.1111/opo.12299

**Keywords:** dizziness, systematic review, vision, visual impairment

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Received: 21 December 2015; Accepted: 3 March 2016; Published Online: 2 June 2016

## Abstract

*Purpose:* The aim of this study was to systematically review the literature to investigate the link (if any) between vision and dizziness.

*Methods:* Medline, CINAHL, AMED, Web of Science and The Cochrane Library were searched with keywords chosen to find articles which investigated the causes of dizziness and considered vision as a possible trigger. Citation chaining of all included papers was performed in addition to the hand searching of all reference lists. Unpublished literature was identified using [www.opengrey.eu](http://www.opengrey.eu). The review considered studies involving adults which link, measure or attempt to improve any aspect of vision in relation to dizziness.

*Results:* Nine thousand six hundred and eighty one possible references were found, and the abstracts were screened independently by two reviewers to determine if they should be included in the study. Thirteen papers were found which investigated whether dizziness was linked to an assessment of vision. Visual impairment measures were crude and typically self-report, or Snellen visual acuity with little or no measurement details. Five studies found an independent link between dizziness and vision, five found a weak association (typically finding a link when univariate analyses were used, but not when multivariate analyses were used), and three found no association. Studies finding a strong link were usually cross-sectional with a large study population whereas those finding a weak association had relatively small numbers of participants. Studies which did not find an association used a broad definition of dizziness that included the term light-headedness, an unreliable Rosenbaum near visual acuity chart or an unusual categorisation of visual acuity.

*Conclusions:* This review suggests that dizziness (although likely not 'light-headedness') is linked with poor vision although further studies using more appropriate measures of vision are recommended.

## Introduction

In this systematic review, we aimed to investigate the link (if any) between the assessment of vision and/or refractive correction and dizziness. Traditionally, dizziness has been sub-divided into the four categories suggested by Drachman and Hart<sup>1</sup> These are: vertigo, the feeling that surroundings or self are spinning; pre-syncope, the feeling that one is about to lose consciousness; disequilibrium, the feeling of losing one's balance when standing still and light-headedness, which is often used to describe the feeling

associated with postural hypotension. Disequilibrium and vertigo are of particular interest to this study as they both involve movement, the detection of which relies on the visual system. It seems less likely that light-headedness and pre-syncope would be linked to vision. It is difficult to precisely define the term dizziness. Light-headedness, swimming, floating, rocking, spinning, unsteadiness, giddiness, faintness, impending loss of consciousness, unreality, disorientation and imbalance are all used when patients describe their feeling of dizziness. It has been described as a 'non-specific symptom'<sup>2, 3</sup> which has different meanings to

different individuals, therefore practitioners are advised to ascertain exactly what symptoms their patient has when they use the term dizziness.<sup>4</sup> Warner *et al.*<sup>5</sup> described dizziness as ‘an uncomfortable, disturbed state of spatial awareness’. It could be argued that this definition is suitably ambiguous as the term ‘dizziness’ may be used to describe a variety of often quite vague symptoms, making the condition somewhat difficult to assess and treat.

Dizziness has a prevalence of between 20% and 30% in the elderly population<sup>6–8</sup> and 20–25% in those of working age.<sup>2</sup> Since documentation of dizziness relies on self-report by the patient, these figures may be underestimated due to inaccurate recall (as with falls<sup>9</sup>), differing definitions of dizziness and the exclusion of people with cognitive decline. Dizziness has many different causes. Among these are vestibular disease, which has been found to be a contributing factor in around a third of cases<sup>1,10</sup> and vascular disease, accounting for between 14% and 57% of cases, depending on the population being studied.<sup>11,12</sup> Often, it is not possible to identify a single source for the problem as dizziness is frequently multifactorial<sup>13</sup> and dizziness has been proposed as a geriatric syndrome.<sup>7</sup>

Dizziness can be a debilitating and distressing problem which has emotional and psychological difficulties associated with it as well as functional issues.<sup>14</sup> Dizziness often triggers anxiety<sup>2, 14</sup> and anxiety may lead to dizziness, leaving the patient in a self-perpetuating condition that they feel they may not be able to escape. One of the more serious problems associated with the sensation of imbalance is the increased tendency to fall,<sup>15</sup> especially in the elderly population.<sup>16</sup> When an elderly person falls, it may cause injury and hospitalisation leading to reduced quality of life and loss of independence for the individual.<sup>15</sup> It has been shown that people who have dizziness have a lower perception of their health-related quality of life than non-dizzy people and that dizziness may cause an interruption of normal daily living activities and the tendency to avoid leaving the home. This in turn, presents the sufferer with the economic burden of having to take sick leave, both for themselves and their employer.<sup>10</sup> Dizziness, therefore, can place an economic burden on the community as well as the individual.

There are several possible links between vision, refractive correction and dizziness. First, balance control (or postural stability) is achieved when the visual, vestibular and proprioceptive systems are effectively coordinated.<sup>17</sup> If there is an impairment of one of these systems, the individual relies more heavily on the other two to maintain postural control and minimise disequilibrium and dizziness.<sup>18</sup> The visual element of balance control is influenced by central and peripheral vision as well as eye movements<sup>19</sup> and postural stability has been shown to be reduced in patients with

refractive blur, age-related eye disease and eye movement disorders.<sup>20–23</sup>

Second, vision may be associated with dizziness via changes to the vestibulo-ocular reflex (VOR). This reflex ensures the focussed retinal image is stabilized on the retina during head movements by means of equal eye movements in the opposite direction. However, new spectacles change magnification and alter the amount of eye movement gain that is needed to match head movement: myopes tend to have lower VOR gains and hyperopes higher VOR gains<sup>24</sup> For example, a myopic change in refractive correction in new spectacles minifies the visual world so that a head movement of, say, 20° leads to a much larger eye movement than is now needed (the patient should use a lower VOR gain) and the visual world will move or, as described by patients, it will ‘swim’ and this could cause dizziness. The adaptation with astigmatic changes is complicated further as different amounts of magnification occur in different meridians. Similarly, adaptation to progressive addition lenses is complicated by variation in magnification across the lens requiring variable VOR gain across the visual field.<sup>25</sup>

Third and finally, some patients are diagnosed with Visual Vertigo typically due to unilateral vestibular problems in patients suffering from anxiety.<sup>26</sup> Their dizziness is triggered by an increased sensitivity to rapid changes in their visual surroundings,<sup>27</sup> likely due to altered visual-vestibular integration, leading to greater visual reliance for postural control.<sup>18, 26</sup>

## Objectives

If the role of vision and refractive correction in patients with dizziness can be identified and quantified, it may be possible to manipulate vision and the refractive correction to reduce the symptoms of these patients, thus improving the quality of life of those individuals.

In this systematic review we aimed to:

- Investigate the link (if any) between vision and refractive correction and dizziness.
- Determine the methods of measurement of dizziness and vision in research settings and how the link between dizziness and vision may be affected by these methods.
- Determine whether further investigations are needed in this field.

## Methods

### Inclusion criteria

This review considered all studies involving adults over the age of 18 years where vision was deemed to be among the factors contributing towards dizziness. Studies

which linked or measured any aspect of vision and/or refractive correction in relation to dizziness were considered. The primary outcome of interest was the link between dizziness and vision. Secondary outcomes were the measurement methods used to quantify both dizziness and vision. There were no restrictions on the publication year or status of papers. Case reports were excluded from the review as the evidence offered by them is of the lowest quality.<sup>28</sup> Only papers published in English were included in the review as no translation facilities were available.

### Search strategy

Databases searched were Medline (1944–2015), CINAHL (1932–2015), AMED (1980–2015), Web of Science (1950–2015) and the Cochrane Library. Reference lists from papers included in the review were hand searched and citation chains of all included papers were also hand searched for further papers using Google Scholar.<sup>29</sup> Unpublished sources were searched for using www.opengrey.eu, to reduce publication bias.<sup>29</sup>

Subject librarians at the University of Bradford library were consulted about methods for deciding upon the search terms to be used. The search terms were (dizz\* or vertigo or 'postural imbalance' or 'postural balance' or 'postural stability' or disequilibrium or oscillopsia or 'light-headed' or disorient\*) AND (vision or visual or sight or 'dynamic visual acuity' or ocular or 'depth perception' or stereopsis or 'contrast sensitivity' or spectacles or 'refractive error' or multifocal or bifocal or magnification or optometrist or optometry or 'field of vision' or 'stereo acuity' or AMD or glaucoma or diabet\* or cataract or macular or 'eye disease') The combination of search terms is presented in Table 1.

### Search protocol

Two reviewers, DA and EC, independently searched the databases using the defined strategy. Titles and abstracts of papers identified by the search were reviewed by each reviewer to determine eligibility for inclusion. The two lists of relevant abstracts were then compared and any abstract identified by only one reviewer was read by a third researcher (AA) who made the final decision on inclusion.

Both DA and EC independently read the full documents of the remaining papers and made decisions on eligibility. The final list of papers from each reviewer was then compared, and again, any papers identified by only one reviewer were read by AA to determine eligibility. DA and EC manually screened the reference lists and citation chains of each included paper to identify any further studies which should be included. All included papers were stored on an

**Table 1.** Table showing how the search terms were combined during the initial database searching for the systematic review

Search terms			
Dizz*	Vision	"Refractive error"	Glaucoma
Vertigo	Visual	Multifocal	Diabet*
"Postural imbalance"	Sight	Bifocal	Cataract
"Postural balance"	AND	"Dynamic visual acuity"	Macular
"Postural stability"	Ocular	Optometrist	"Eye disease"
Disequilibrium	"Depth perception"	Optometry	Spectacles
Ocillopsia	Stereopsis	"Field of vision"	AMD
"Light headed"	"Contrast sensitivity"	"Stereo acuity"	
Disorient*			

\*denotes a search for any word that begins with these letters.

Endnote library and a PRISMA<sup>30</sup> flow diagram was used to document study selection (Figure 1).

### Quality assessment and data extraction

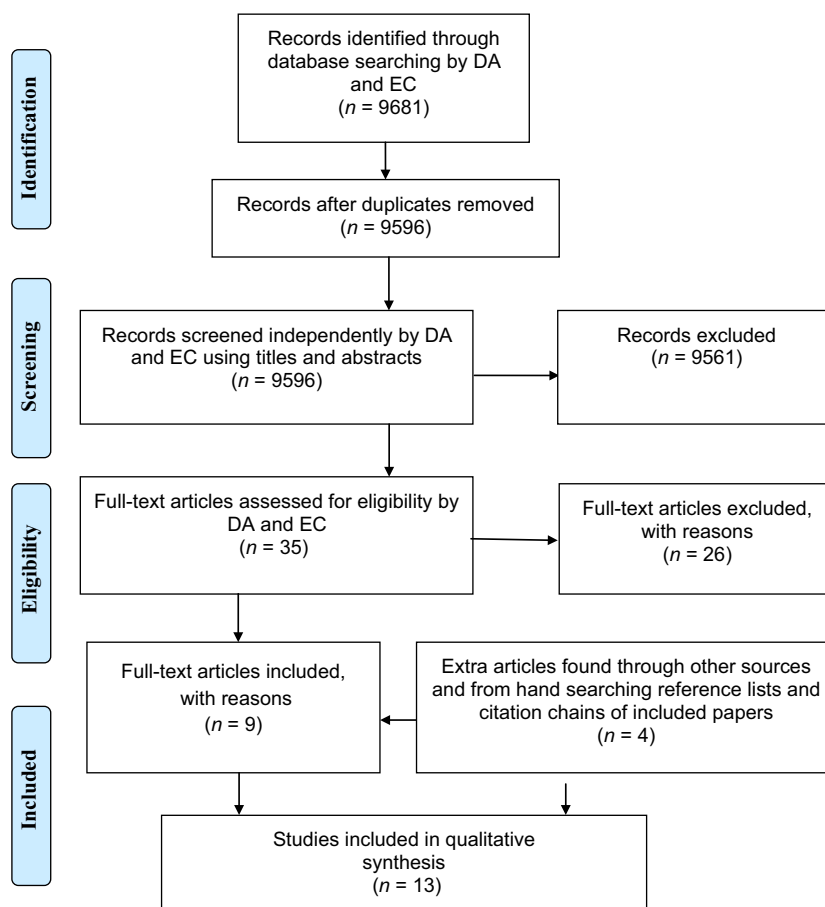
Review specific data extraction forms were created using the Critical Appraisal Skills Programme (CASP) quality assessment tool guidelines<sup>31</sup> The data extraction forms were piloted before the full data search by DA and EC who independently completed data extraction forms for two studies and discussed the results with AA in order to produce the optimum document.

Four screening questions were included in the data extraction sheet, and studies which failed these questions were excluded from the review. Data extraction forms were completed by both DA and EC for each study included in the review. Disagreements between reviewers were discussed and resolved with the assistance of AA.

The Strengthening of the Reporting of Observational Studies in Epidemiology (STROBE)<sup>32</sup> guidelines were used to indicate the quality of included studies. Four researchers independently assessed each paper according to these guidelines. Their findings were then discussed and an agreement was reached about the STROBE score to be given to each paper. The included papers were initially grouped according to the methods used to measure visual function and dizziness. Studies were then assessed to determine what association (if any) was found between vision and dizziness.

### Results

Initial database searching identified 9681 papers, with 85 of these being removed as duplicates and title and abstract



**Figure 1.** PRISMA flowchart showing the number of papers at each stage of the systematic review process.

screening determined that 35 should be read in full. After the screening process was complete, 13 papers were found which attempted to determine whether there was an association between dizziness and vision.<sup>7, 8, 11, 33–42</sup> Reasons for rejection are presented in *Table 2*. Eight of the included studies were cross-sectional, four were cohort studies, and one was a case control study. Six papers studied a population of 65 years and above, five investigated people of 60 years and above and one study's population was 72 years and above, with the remaining study examining a population of 73–92 years. Of the included studies, five were conducted in the USA, three in the Netherlands, two in the UK, and one in each of Colombia, Sweden and Australia. Both genders were included in all studies.

The 13 papers that have attempted to determine whether there is a link between dizziness and vision are presented in *Tables 3, 4* and *5*. All thirteen papers were reviewed independently by the four authors and the strength of the association between vision and dizziness was estimated. If vision was found to be an independent risk factor we classed it as a strong association and if an association was found in univariate analysis but not in multivariate this

was classed as weak association. Any disagreements were discussed subsequently and a final decision agreed upon. Each table includes information about dizziness and vision assessment along with study design, quality assessment and population. *Table 3* presents information from three studies that found no association, *Table 4* presents information from five studies that found a weak association and *Table 5* presents information from five studies that found a strong association.

## Discussion

### Studies that found no association between vision and dizziness (*Table 3*)

These three studies, (all with good quality reporting levels) included the term 'light-headedness' in their dizziness definition. This term has links with postural hypotension and feeling faint, which may cause dizziness but has little or no association with vision. Participants (who were largely made up of the older, elderly population – 72+ years) were asked to self-report their dizziness over a long period of time (12+ years<sup>40</sup>) and a lifetime<sup>41</sup> This has implications

**Table 2.** Reasons for rejection of papers which were read in full

Reason for rejection of paper	Number of papers rejected
Doesn't attempt to link dizziness with vision	7
Discussion article – information based on clinical experience rather than evidence	6
Balance, not dizziness investigated	6
Case report	3
Weak statistics (vision grouped with spectacles or sensory impairment; percentages of patients with risk factors given with no significance values)	3
Same data used as other included study	1

for recall bias and means that a vision measurement made at the time of the examination was compared to a report of dizziness over a long time span. It is impossible to know the participants' vision status at the time that they were dizzy and many of them are likely to have had cataract surgery<sup>43,44</sup> and/or new spectacles within this time frame. These studies used differing methods of vision assessment with none of them providing details of visual acuity measurement such as the distance at which the measurement was taken, luminance levels, whether the measurements were taken monocularly or binocularly or with or without spectacle correction, the type of chart used (assumed to be Snellen), the number of clinicians used to take the measurements (inter-clinician measurements have been shown to have a low levels of repeatability<sup>45</sup>) or whether a termination rule of visual acuity measurement was followed.<sup>46</sup> Tinetti *et al*<sup>7</sup> used the Rosenbaum near vision card which has been shown to be unreliable.<sup>47</sup> Only Aggarwal *et al*<sup>41</sup> specified that spectacles were worn at the time of the test.

**Studies that found a weak association between vision and dizziness (Table 4)**

Five studies found a weak association between vision and dizziness. These studies largely had small populations (hundreds rather than thousands of participants) and the association was found using univariate analyses meaning that vision may not have had an independent association with dizziness. In four of the papers, no attempt was made to quantify dizziness, with its presence being determined by asking the participant a single question about their dizziness status. Snellen (or unspecified) visual acuity was used to describe vision in three of the studies,<sup>8,37,38</sup> and this method of measurement has been shown to be a poorly reliable method of assessment<sup>48,49</sup> Again, no details about visual acuity measurement were offered, as was the case in the studies which did not find

**Table 3.** Methods of vision and dizziness assessment for studies that found no association between dizziness and vision

Paper	Design and population	Dizziness assessment	Vision assessment	Association OR (95% CI) or Prevalence (%)	Participant number (N)	STROBE quality/22	Comments
1. Aggarwal <sup>(41)</sup> <i>J Gerontol</i> , 2000	Cross-sectional 65+ USA	"Have you ever been dizzy or light-headed?"	Snellen VA with specs (type not specified, assumed distance)	No association in MV analyses (no data shown)	672	18	Broader definition of dizziness, includes light-headedness. Odd categorisation of VA (6/12 or better; 3/30–6/60 or 6/120+)
2. Menant <sup>(40)</sup> <i>JAGS</i> 2013	Cohort, prospective, secondary analysis 73–92 Australia	"Since the age of 60 years, have you suffered from dizziness or vertigo and light-headedness when standing"	Edge contrast sensitivity	Vision impairment 35% dizzy vs 30% non-dizzy; NS CS 21.2 dB ± 1.9 dizzy vs 21.3 ± 2.0; NS	Dizzy 217 Non-dizzy 299	17	No link with vision. Broader definition of dizziness, includes light-headedness
3. Tinetti <sup>(6)</sup> <i>Ann Int Med</i> 2000	Cross-sectional 72+ USA	"During past 2 months have you had episodes of feeling dizzy, unsteady or like you were spinning or moving, light-headed or faint?"	50% visual impairment calculated from near VA with Rosenbaum card	Visual impairment > 50% 36% dizzy vs 36% not dizzy; <i>p</i> > 0.2	1087	20	No link with near visual acuity. Broad definition of dizziness as includes light-headedness & feeling faint

MV, multivariate; NS, not significant; CS, contrast sensitivity; VA, visual acuity; OR, odds ratio; CI, confidence interval.

**Table 4.** Methods of vision and dizziness assessment for studies that found vision had a weak association with, dizziness

Paper	Design and population	Dizziness assessment	Vision assessment	Association OR (95% CI) or prevalence (%)	Participant number (N)	STROBE quality/22	Comments
4. Colledge <sup>(37)</sup> <i>BMJ</i> , 1996	Case control 65+ USA	"Have you suffered from dizziness every 3 months or more?" Y/N	Eye disease: from medical records VA (Snellen)	Subjects with eye disease 35% dizzy vs 12% control; $p < 0.001$ VA < 6/9, both eyes 15% dizzy vs 4% control; $p = 0.015$	246 (Dizzy) 149 (Control) 97	18	VA and "eye disease" from medical records more prevalent in dizzy patients
5. Dros <sup>(38)</sup> <i>Health &amp; Qual Life Outcomes</i> 2011	Cross-sectional 65+ Netherlands	Dizziness Handicap Inventory questionnaire	VA – method not specified.	UV: OR 1.7 (1.1–2.7) Not in MV model	417	16	Weak link between visual acuity and impact of dizziness. Limited information available.
6. Kao <sup>(7)</sup> <i>JAGS</i> 2001	Cross-sectional 60+ USA	Physician asking direct questions, not specified	Snellen VA Cataract from medical records	VA of worse than 6/18 8% dizzy vs 13% non-dizzy, $p = 0.37$ Cataract UV: 28% dizzy vs 12% non-dizzy, $p = 0.03$ MV: OR 5.3 (2.2–12.9)	292 (Dizzy) 84, non-dizzy, 208	17	No link with VA: Cut off of 6/18 lead to low prevalence in both groups Strong independent link between cataract in GP notes and dizziness.
7. Maarsingh <sup>(11)</sup> <i>BMC Fam Pract</i> 2010	Cross-sectional, prospective 65+ Netherlands	Those who consulted GP due to dizziness	Data from GP notes, impaired vision and cataracts	UV: Cataract 3.7% dizzy vs 2% non-dizzy, $p < 0.001$ Impaired vision 1% dizzy vs 0.6% non-dizzy, $p = 0.006$	3990	16	Weak link between cataract/impaired vision and dizziness. Low prevalence of impaired vision from GP notes limiting usefulness in MV analysis.
8. Olsson Moller <sup>(39)</sup> <i>Arch Geronto &amp; Geriatr</i> , 2013	Cohort, longitudinal 60–96 Sweden	"Have you experienced dizziness in last 3 months" Y/N	"Do you have problems with your vision?" Y/N	<80 years: 31% dizzy vs 21% control; $p + 0.028$ 80+ years: 48% dizzy vs 42% control, $p = 0.46$	<80: 531 80+: 146	17	Self-reported visual problems a weak predictor of 6 year dizziness. Numbers small for 80+ year group.

UV, univariate; MV, multivariate; VA, visual acuity; Y/N, yes or no answer; OR, odds ratio; CI, confidence interval.

**Table 5.** Methods of vision and dizziness assessment for studies that found vision had a strong association with dizziness

Paper	Design and population	Dizziness assessment	Vision assessment	Association OR (95% CI) or prevalence (%)	Participant number (N)	STROBE quality/22	Comments
9. Gomez <sup>(33)</sup> <i>J Nutr, health &amp; ageing, 2011</i>	Cross-sectional 60+ Colombia	"Have you ever been bothered by dizziness in the past month"	"Trouble with vision?" Y/N	UV: 1.83 (1.33–2.52); $p < 0.001$ MV: 1.48 (1.05–2.08); $p < 0.02$	1692	17	Dizziness independently linked with self-reported "trouble with vision"
10. Maarsingh <sup>(34)</sup> <i>BMC Geriatr, 2014</i>	Cohort, prospective 60+ Netherlands	"Are you dizzy regularly?" Y/N	"Can you see well enough?" Y/N	7 years UV:2.3 (1.5–3.6); $p < 0.001$ 7 years MV: 1.8 (1.1–3.0); $p = 0.016$	1379	18	Visual impairment an independent predictor of future dizziness at 7 years
11. Sloane <sup>(35)</sup> <i>JAGS, 1989</i>	Cross-sectional 60+ USA	"Have you ever been bothered by dizziness?"	"Blurry vision" or "poor eyesight" or "blindness" Y/N	UV: Risk ratio 2.58, $p < 0.001$ MV: OR 3.7 (2.7–4.9); $p < 0.001$ for 'neurosensory impairment' (10 variables including 'blurry vision', 'poor eyesight & 'blindness' Y/N)	1622	15	Strong association between dizziness and various aspects of poor vision
12. Stevens <sup>(36)</sup> <i>Age &amp; Ageing, 2008</i>	Cross-sectional 65+ England	"How often do you have problems with dizziness when you are walking on a level surface?"	Rate sight (very good, good, fair, poor)	MV: 1.7 (1.2–2.4)	2925	11.5	Self-reported poor vision an independent predictor of dizziness
13. Supuk <sup>(42)</sup> <i>OPO 2015</i>	Cohort, prospective & retrospective 65+ England	Dizziness Handicap Inventory (short form) questionnaire	Distance VA (logMAR) pre & post operation	Change in best eye VA MV: OR 17.71, $p = 0.003$	287	19	Dizziness improved by cataract surgery and linked with best eye VA change. Oblique astigmatism may increase dizziness

UV, univariate; MV, multivariate; Y/N, yes or no answer; VA, visual acuity; OR, odds ratio; CI, confidence interval.



a link between vision and dizziness (see the above discussion). The term 'impaired vision' is not defined in any of these studies. The cut off, for what is termed 'impaired vision' varied between studies and the categories (where stated) did not divide the data equally. For example, Kao's paper has a cut off of 'VA worse than 6/18' which would mean the majority of participants would be in the 'good vision' category, placing the remaining participants in the 'poor vision' category. This leaves sample sizes in the intermediate (where categorised) and poor vision categories with much reduced numbers when compared with numbers in the good vision category.

### Studies that found a strong association between vision and dizziness (Table 5)

Five studies<sup>33–36,42</sup> found an independent association between dizziness and vision. Four of these reports had large study populations of over 1000 participants. Multivariate analyses were used, indicating that an independent association of vision with dizziness was found. Studies asked patients mainly about recent dizziness with Supuk *et al.*<sup>50</sup> quantifying the amount of dizziness experienced using the short form of the Dizziness Handicap Inventory, which has been Rasch analysed and shown to have good validity. Four studies<sup>33–36</sup> did not measure visual acuity, preferring to use self-report of vision as an indicator of visual status.<sup>33–36</sup> This suggests that dizziness may be more highly linked to an individual's perception of their vision, rather than to their measured vision. Anxiety can have a negative effect on self-perceived health<sup>51</sup> and several studies have shown anxiety to be a risk factor for dizziness<sup>2, 52, 53</sup> with patients who suffer from anxiety disorders tending to feel more handicapped by their dizziness when conducting their daily tasks than those who are not anxious.<sup>54</sup> Although Gomez<sup>33</sup> and Stevens<sup>36</sup> did not investigate anxiety, Maarsingh<sup>34</sup> and Sloane<sup>35</sup> included 'anxiety', or 'perception of self as a nervous person' in their multivariate analyses<sup>34, 35</sup> and yet those analyses suggested that self-reported poor vision was an independent risk factor for dizziness even after adjusting for anxiety measures. This suggests that poor vision may well be an independent risk factor for dizziness. Maarsingh's<sup>34</sup> paper also concluded that visual impairment is an independent predictor for future dizziness at seven years indicating that the association between vision and dizziness may well be strong.

### Limitations

There may have been search terms which were overlooked when deciding upon the search strategy. This would result in papers which should have been included in the study being omitted, however hand searching the reference lists

and citation chaining all the included papers would safeguard against missing any significant papers. The exclusion of papers not written in English may have resulted in significant papers being overlooked from this review. The assessment of the extent of the association between dizziness and vision was independently made by several researchers and then agreed upon, but as all were clinical vision scientists (two of which were authors on a recent study included in this review<sup>42</sup>) there may have been a bias towards finding an association rather than the reverse.

### Recommendations

Standardisation of methods of vision and dizziness assessment would aid comparison of findings. The use of a validated questionnaire, such as the Dizziness Handicap Inventory<sup>55</sup> or its short form<sup>50</sup> to quantify dizziness would help to determine the severity and character of the problem. The nature of visual impairment is very much dependent upon what has caused the difficulty, thus, a simple measure of visual acuity using Snellen charts may not accurately quantify the visual impairment of someone with visual field or contrast sensitivity loss. Snellen visual acuity measurements have been shown to have poor repeatability due to practitioner and observer variability,<sup>45</sup> and poor chart design<sup>48</sup> highlighting the need for a more accurate assessment of visual acuity. In addition, a more comprehensive assessment of visual function to include aspects of vision such as contrast sensitivity, visual field and stereoacuity is required to accurately assess vision status. Future studies should be undertaken using more appropriate measures (and cut off values) of vision and dizziness (which should be measured at the same time) to quantify the association between the two, as to date, studies have not done this reliably. Investigations into links between dizziness and vision in the working age population would help to ascertain whether this is a concern for all patients who suffer from dizziness, or whether the problem is limited to the elderly population.

### Conclusion

This review has identified an area where little research has been published to date. The inconsistency of measurement methods for dizziness and vision made accurate comparison of studies difficult. Studies finding no link between vision and dizziness all included the term 'light-headedness' in their definition of dizziness, used participants from the older, elderly population (72+ years) and asked patients to recall dizziness over a long period of time. Those finding a weak association between vision and dizziness had relatively small numbers of participants and did not attempt to quantify dizziness or define what

was meant by 'impaired vision'. The five studies finding an independent association between vision and dizziness were typically cross-sectional with large study populations who were mainly asked about their recent dizziness and self-perceived vision status. The overall evidence therefore suggests that dizziness (although likely not when light-headedness is included in the definition of dizziness) is linked with poor vision.

### Acknowledgements

Deborah Armstrong was funded by a College of Optometrists Research Scholarship and Emily Charlesworth by a College of Optometrists summer studentship.

### Disclosure

No conflicting relationships exist for any of the authors.

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