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Designing an Internet-based intervention for improving wellbeing in people with acquired vision loss: A Delphi consensus study

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Abstract

Purpose: Vision impairment (VI) may impact a person's functional ability resulting in a loss of independence, anxiety, depression, social isolation and reduced quality of life. Caregivers also experience similar problems due to the increased burden placed on them. Support to address these difficulties encountered by those with a VI and their caregivers may not always be accessible. An Internet-based intervention may provide more accessible support. The aim of this study was to obtain consensus regarding the content and accessibility features required to design an Internet-based intervention to promote wellbeing for people with a VI and their caregivers.

Method: A three-round Delphi review was conducted with a panel of 30 stakeholders. Three stakeholder groups were included, namely individuals with vision loss, experts in the field of vision loss and mental health, and carers of individuals with vision loss. Conceptual wellbeing ideas were examined in round 1, the intervention modules and module content were proposed in round 2 and refined in round 3.

Results: Consensus of 75% or more was reached to include 18 modules into the intervention. These were divided into seven sections: understanding vision loss, emotional wellbeing, functional wellbeing, social wellbeing, physical wellbeing, wellbeing for carers, and maintaining wellbeing. The accessibility features deemed most important were font size, colour and contrast options, compatibility with low vision aids and layout of the intervention.

Conclusions: The Delphi process positively informed the design of an Internet-based intervention for individuals with acquired VI and their caregivers. Suggestions provided by stakeholders should now be incorporated into the intervention. Future evaluation of efficacy and cost-effectiveness of such an intervention are necessary.

Introduction

There are an estimated 2 million individuals with vision impairment (VI) in the UK.¹ The onset of vision loss can result in poor mobility, functional difficulties and a loss of independence² which can decrease the wellbeing of an individual.³ Wellbeing can be defined as ‘an umbrella term for different valuations that people make regarding their lives, the events happening to them, their bodies and minds, and the circumstances in which they live’.⁴ Some psychological indicators of reduced wellbeing include increased risk of anxiety,² mental fatigue,⁵⁻⁷ social isolation,^{6,8} loneliness⁵⁻⁹ depression⁹⁻¹¹ and can reduce quality of life.^{12,13} Individuals with VI have access to help through low vision rehabilitation services.^{14,15} While these services help improve functional ability, provision of additional emotional and mental health support is not always possible due to a lack of resources.¹⁴ To address additional emotional and mental health issues, referrals for psychotherapy can be made via Improving Access to Psychological Therapies (IAPT). This is provided by the National Health Services (NHS) in accordance with the National Institute for Health and Care Excellence (NICE) guidelines.¹⁶ Accessing such mental health services in the UK may involve face-to-face talking therapies, with or without supplemented medication, and/or support from digital resources such as apps or Internet-based interventions. Some of these generic services are not always accessible as they are not tailored to account for the visual difficulties that people with VI experience. Individuals with VI are not always able to access face-to-face talking therapies and rehabilitation support services because of constraints related to transport, geographical location of clinic and/or finances.¹⁴ Attending clinics in unfamiliar settings can also be anxiety-provoking due to additional difficulties navigating in new surroundings and conversing with people who may not have the skills to adapt communication to accommodate individuals with VI.^{17,18}

Remotely accessible services reduce the difficulties resulting from attending clinics. An Internet-based intervention is one format of remote support. It may be an attractive alternative intervention option for those with VI as it allows flexibility for individuals to complete modules in their own time and space without the need to travel to in-person appointments.¹⁹ Internet-based interventions have been used for a variety of long-term chronic health conditions.^{20,21} Although some address wellbeing, the generic nature of these interventions may not address functional and wellbeing difficulties specific to people with a VI. To date, relatively few Internet-based interventions have been adapted for a VI population and those that do exist have been developed for specific types of VI. One example is an Internet-based intervention to address depression in individuals with retinal exudative diseases, receiving intraocular anti-vascular endothelial growth factor therapy

injections.¹⁹ The use of such an intervention has demonstrated the feasibility of delivering an Internet-based intervention for individuals with a VI.¹⁹

Individuals with VI can be heavily reliant upon their caregivers to provide active assistance with daily tasks including help with social engagements, transport and managing finances.^{22,23} The increased pressures placed on caregivers elevates the risk of them developing depression,²¹ due to the lack of support in addressing this additional stress^{24,25} and therefore the wellbeing of carers should also be prioritised. Internet-based interventions have been used as an accessible means of providing such support and have been shown to improve the wellbeing of caregivers looking after those with long term disabilities.²⁶ However, an Internet-based intervention designed to help caregivers of individuals with a VI and the specific challenges they face is not readily available. A single Internet-based intervention aimed at both the person with a VI and their caregiver could enhance wellbeing for both these at-risk populations. It is interesting to note that caregivers of people with Retinitis Pigmentosa perceive the difficulties that their person with VI experience differently to the people themselves (specifically, overestimating the difficulty of practical tasks relative to the difficulty with emotional tasks).²⁷ Therefore, undertaking an intervention together might be anticipated to improve mutual understanding of the difficulties faced and increase compliance as the person with a VI and their caregiver can support each other through the intervention.²⁸

Various strategies have been used to address wellbeing in the general population. These include improving problem solving skills, personal skills/education, exercise, psychotherapies, stress management training, relaxation, and mindfulness.²⁹ The impact of the COVID-19 pandemic has highlighted the need for such face-to-face strategies to be adapted and used remotely. Many of the intervention strategies used will coincide with existing face-to-face interventions. However, a challenge with interventions aimed at people with VI is the heterogenous nature of VI and so the concept of this intervention is that people can choose the optional modules they feel are most appropriate for them. Therefore, this study seeks to obtain guidance through expert consultation in the form of a Delphi study. The Delphi process relies on a panel of experts, who give their opinions through consecutive online surveys in a series of consultation rounds. This approach is appropriate when research in the area of study is limited and therefore expert opinions are the most reliable data available.³⁰

The aim of the current study is to obtain expert guidance regarding the development of an intervention to address wellbeing for individuals with VI and their carers. The objectives were to identify: (i) which conceptual ideas the intervention should be based on (ii) which strategies to

include within the intervention; (iii) the content for each module; and (iv) the functionality adaptation required to ensure accessibility of the intervention content for people with a VI.

Methods

Study Design

A Delphi study was conducted in order to gather expert opinion regarding the components required to design an online intervention to improve wellbeing in people with a VI and/or their caregiver(s). The Delphi approach is a structured method to systematically consult a panel of expert stakeholders, with the goal of reaching consensus in a relatively efficient and cost-effective way.^{31,32} In this study, consensus was defined as >75% panellist agreement to be within the range for similar studies (range: 50–97%).^{33,34} When consensus was not achieved, suggestions made by the stakeholders were implemented and questions were restated. Once consensus was reached on a conceptual idea, there were no follow-up questions in the subsequent rounds. The study was approved by the Faculty Research Ethics Panel at Anglia Ruskin University (FREP 0819-01) and conformed to the tenets of the Declaration of Helsinki. The checklist of the Conducting and Reporting of Delphi Studies (CREDES) was used to report this study.³⁵

Delphi Stakeholder recruitment

The panellist sample size was based on guidelines indicating that 15 to 30 panellists are required for Delphi panels.³⁶⁻³⁷ A sample size of 30 was selected, which is similar to that of previous Delphi studies.³⁸⁻⁴³ Three expert groups were selected, namely (i) those with acquired VI ($n = 15$) (ii) caregivers of individuals with a VI ($n = 5$) (iii) Experts who work with patients with a VI (ophthalmologists, optometrists, rehabilitation officers, eye clinic liaison officers and psychologists with a knowledge of psychological interventions to improve wellbeing) ($n = 10$). The targeted stakeholders, namely those with a VI and their caregivers, were prioritised (67% of the panel) to ensure service-user accessibility and satisfaction.⁴⁴ Experts with experience of working with people with a VI were also sought (33% of the panel).

The panellist eligibility criteria were (i) knowledge in the field of vision loss, (ii) able to read and respond to the survey in English and (iii) access to the internet. Purposive sampling was used to recruit participants via vision loss charitable organisations and professional group forums. This sampling technique focused on particular characteristics of the target population.

Development of the Intervention Design

The theoretical framework of the intervention design was based on Luu et al.'s Quality of Life (QoL) model.⁴⁵ This model has four dimensions (i) physical factors, (ii) functional factors, (iii) social factors and (iv) psychological factors. Specific strategies to address the functional and emotional difficulties and associated comorbidities such as anxiety and depression, faced by people with VI⁴⁶⁻⁴⁸ further informed the intervention design. These strategies included, cognitive behaviour therapy,^{49,50} vision rehabilitation (e.g. orientation, mobility, daily living and activities),^{49,50} relaxation,⁵¹ mindfulness,⁵² social participation,⁵³ health and exercise programmes⁵⁴ and self-management skills to cope with the vision loss.⁵⁵⁻⁵⁸ The intervention design furthermore included suggestions to support caregivers and reduce the associated caregiver's burden and stress.²⁶ Based on these strategies, the intervention was designed into separate modules. In addition, an introduction section on navigating the intervention was proposed. This will include instructions and suggestions on how to make the information on the intervention more accessible using various built-in functions as well as using assistive technologies such as screen readers. The Delphi review process was used to identify which modules reached consensus from stakeholders for inclusion in the intervention. Modules that did not reach consensus on the survey will not be included in the first iteration of the intervention as the intervention design is anticipated to be comprehensive but not too overwhelming, hence the number of modules will be limited. However, some excluded modules may be included as optional modules in later versions of the intervention. Free-text comment boxes were included throughout rounds 1 and 2 of the Delphi. The comment boxes ensured that stakeholders had the opportunity to add any additional ideas for modules or domains. The suggestions made in round 1 were taken into consideration when developing the second survey. Comments arising from the round 2 informed the design stage of the Internet-based intervention.

Round 1 survey development

The initial Delphi survey was introduced with the aim of reaching consensus regarding the broad conceptual ideas for the potential intervention modules. The survey consisted of 37 questions with 3 sections to include: (i) questions to establish the demographic characteristics (See Table 1) of the stakeholders, (ii) the proposed 15 conceptual ideas (see Table 2) for the intervention to be rated using a 5-point Likert scale ranging from 'strongly agree, agree, neither agree or disagree, disagree, and strongly disagree; and (iii) free-text response to capture any additional thoughts/feedback and suggestions regarding functionality adaptation for the intervention.

To ensure the survey questions were accessible, readability levels were checked. The Flesch reading ease test indicated that the questions were considered easily understandable by an average U.S. 6th grader (Flesch reading ease score of 85.0).⁵⁹ The survey was reviewed by an advisory group to ensure face validity and accessibility for people with a VI. This group consisted of (i) two clinicians who specialise in VI, (ii) two researchers in the field of VI and (iii) three people with VI. The advisors suggested minor amendments which included font and wording changes.

Round 2 survey development

The conceptual ideals reaching agreement in survey 1 were categorised into 7 intervention sections based on structures used by previous psychosocial intervention for people with VI⁶⁰⁻⁶³ as follows: (i) understanding vision impairment, (ii) addressing emotional wellbeing, (iii) suggestions for functional wellbeing, (iv) improving physical wellbeing, (v) enhancing social wellbeing, (vi) addressing carers' wellbeing and (vii) maintaining wellbeing in the long term after completing the intervention (*Figure 1*). For each section, 2-4 modules were suggested to address this aspect of wellbeing as seen in Figure 1.

The second Delphi survey was undertaken with the aim to reach consensus regarding the 21 proposed modules. The survey consisted of 42 questions with 2 sections as follows: (i) rating which of the proposed 21 modules using a 10-point ordinal scale ranging from 1 (module should be excluded) to 10 (very important to include this module), and (ii) free-text response boxes to capture any additional thoughts or feedback. The Flesch reading ease score for questions in round 2 indicated that the survey was considered easily understandable (Flesch reading ease score of 85.0).

Round 3 survey development

Stakeholder feedback was used to reconstruct the module content for which consensus was not reached. The amended modules were the basis of the third survey. Stakeholders were asked to respond to the amended modules using the same 10-point ordinal scale used in round 2. Responses from this third survey were used to finalise the intervention design.

Survey Administration

All three survey rounds were hosted online using Qualtrics (Qualtrics Research Suite, Qualtrics, Provo, Utah, USA) due to its accessibility features suitable for individuals with a VI. Overall, panellists were given 4 weeks to complete and return each survey. The estimated completion time for surveys were 20 minutes for survey 1, 30 minutes for survey two and 10 minutes for survey three. All participants provided electronic informed consent before completing the first survey. There was no monetary compensation or incentive offered for participation.

Data Analysis

Statistical analyses were performed using IBM SPSS Statistics version 26.0 (IBM Corp, 2019). Likert scale and ordinal scale responses were treated as non-parametric data and summarised using the median. Free text responses were analysed using an inductive thematic analysis approach to identify themes.⁶⁴ The broad themes generated were (i) additional content to be added on the intervention, (ii) ways to adapt the intervention for individuals with a VI and (iii) modifications of the content within the module. The coverage of the themes (the frequency with which the codes associated with that theme appeared in the free text comments) was calculated. Themes with low coverage (less than 0.1) were not reported. To ensure inter-rater reliability and reduce bias,⁶⁵ the data were coded independently by two researchers and discrepancies were discussed within the research team.

Results

Stakeholder Characteristics

All 30 panellists completed the first and second survey rounds, and 26 participants completed the third round. The expert group had the lowest mean age (52 years; SD: 8 years), in comparison with a mean of 61 years (SD: 9 years) for those with VI and their carers (62 years; SD: 8). Overall, the sample was well balanced for gender (14 males and 16 females). Stakeholders completing the survey, from a variety of professional roles and specialisms, brought diverse perspectives to the responses. These included an ophthalmologist, a psychologist who works with people with VI, and a specialist optometrist with an accredited qualification in low vision, and rehabilitation officers for visually impaired people (ROVI). Also, regional charity managers, whose roles involve face to face

support and engagement with people with a VI and their caregivers who participate in charity related activities as seen in Table 1.

INSERT TABLE 1 ABOUT HERE

Survey results

Three survey rounds were undertaken as outlined in Figure 1 and described in the sections below.

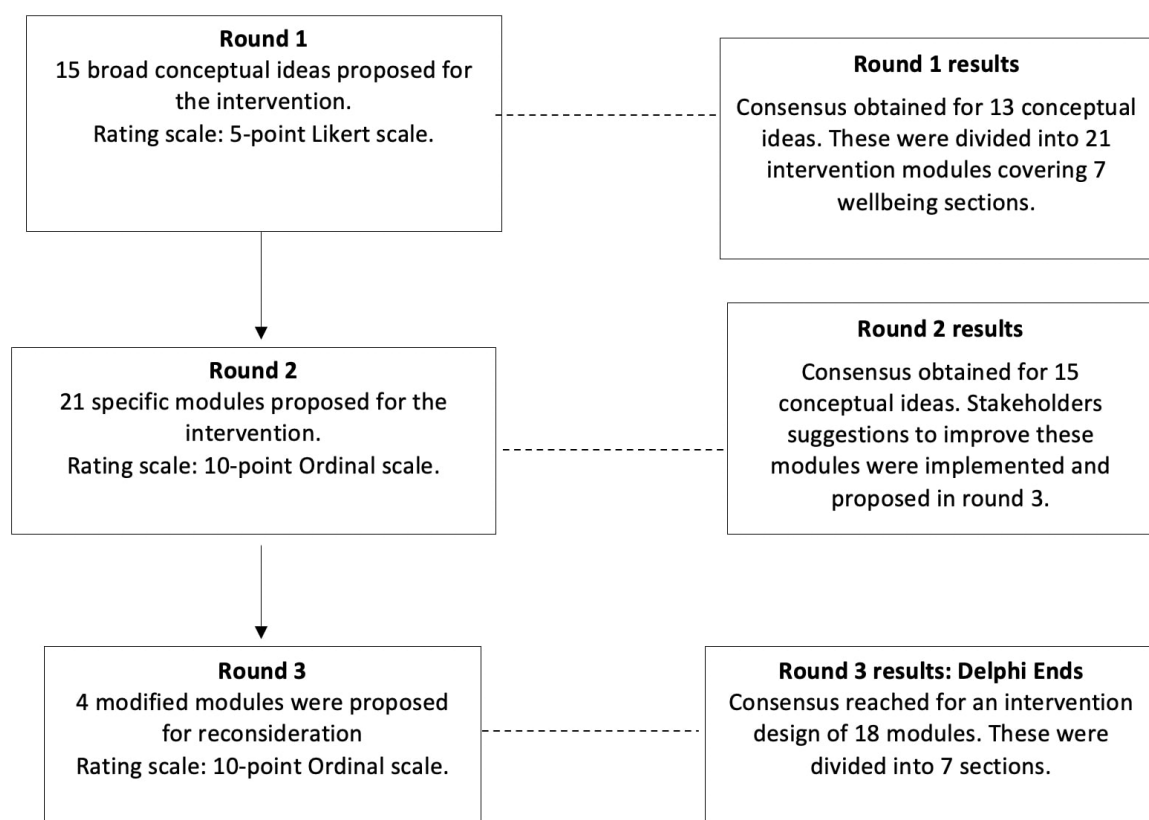


Figure 1. Flow diagram of the development of the Delphi survey process.

Delphi survey: round one

The Likert questions were assessed for internal consistency, which was high (Cronbach's alpha of 0.75). Consensus was defined as achieving >75% agreement (panellist selected 'strongly agree' or 'agree' that the item should be included. Agreement was reached for 13 of the 15 proposed conceptual ideas (see Table 2). As consensus was not met for the conceptual ideas (i) *Introduction to sign language and braille* (30% agreement) and (ii) *including an online chat support forum* (23% agreement), these ideas were excluded from the proposed content for the intervention. The panel

did not support these ideas as they explained that learning braille and sign language was not a priority for individuals with a VI due to the advances that have been made in assistive technology. The panel also indicated that online chat forums already exist on social media platforms (e.g., Royal National Institute for Blind and various Facebook groups) and were thus not required.

The ratings for *social adaptation to vision loss* were higher for the carers than professionals. Ratings for *information on local support services in the UK*, were higher for the professionals than the carers, and the *online chat support forum*, was rated higher by the VI group compared with the carers as seen in Table 2.

Thematic analysis of the free-text responses identified three additional conceptual ideas, which were added to the intervention models. These were:

- (i) How to deal with vision loss in the workplace (coverage 0.20; added to module 10: work adaptations)
- (ii) Ways to build confidence (coverage 0.15; added to module 11: social adaptation)
- (iii) Signposting to additional support and resources (coverage 0.20; added to module 12: information on additional support services)

The following adaptations were suggested to ensure the intervention is user-friendly and accessible for those with VI:

- (i) Accessibility features: the ability to alter font size, colour, good contrast, background colours, audio and output to braille printer (coverage 0.40)
- (ii) Ensuring the intervention is compatible with all screen-readers (coverage 0.40)
- (iii) Consideration needs to be given to the readability and amount of text (avoid blocks of text to read) (coverage 0.30)

INSERT TABLE 2 ABOUT HERE

Delphi survey: round two

Internal consistency for the ordinal scale questions on survey 2 was high (Cronbach's alpha of 0.80). Consensus was reached for 15 of the 21 suggested modules (achieving >75% agreement) (see Table 3). The modules not reaching consensus were module 4: *mindfulness* (73% agreement), module 5: *analysing thought patterns* (64% agreement), module 15: *mindfulness for carers* (24% agreement),

modules 16: relaxation for carers (10% agreement) and modules 19: *review of the goals* (20% agreement) and 20: *review of new skills and information* (20% agreement).

Thematic analysis of the panel's suggestions identified the following suggestions to improve these modules as follows:

- (i) For modules 4: mindfulness and 5: analysing thought patterns: the rationale and evidence-base were not clear as to why these modules should be included in this intervention (coverage 0.36)
- (ii) For modules 15 and 16 supporting caregivers: removing these modules as they were duplicating the mindfulness and relaxation modules already presented.
- (iii) For modules 19 and 20: reviewing of goals: It was suggested that modules 19 and 20 be merged together and completed with a ROVI. This may encourage discussion of additional areas of support the person with a VI might need. (coverage 0.20)

Suggestions made for other modules included:

- (i) For the module 1 on understanding visual impairment: provide simplified information on (i) eye conditions, (ii) eye function, (iii) sight in relation to other senses and (iv) the differences between acquired and congenital loss (coverage 0.66)
- (ii) For module 2: provide information regarding the functional and emotional effects of vision loss, including the grief cycle and different experiences of vision loss (coverage 0.42)
- (iii) For the module 13: Equipment: Provide information regarding the latest low vision aids (coverage 0.36)

To address these above suggestions, a third survey round was devised. The content of the modules not reaching consensus were adjusted using the suggestions made by the panel and these modules were re-evaluated for inclusion within the intervention.

INSERT TABLE 3 ABOUT HERE

Delphi survey: round three

The third survey was completed by 26 stakeholders, comprising of 12 people with a VI, 9 experts who work with people with VI and 5 carers. The modules that did not meet consensus in round two were modified based on panel feedback. These modifications were proposed to the stakeholders during survey round three. The evidence-based and a stronger rationale for including modules 4, *mindfulness* and module 5 *addressing thought patterns* was provided for stakeholders to reconsider these modules. For the caregivers’ section, to remove the modules regarding mindfulness and relaxation and only have the modules supporting the role of caregivers and benefits for carers. For modules 19, *review of the goals set at the start of the intervention* and 20, *review skills learnt on the intervention* it was proposed that they were merged together. These modules all reached consensus in round 3 as shown in Table 4. The final intervention design consisting of 18 modules divided into 7 intervention sections is seen in Figure 2.

INSERT TABLE 4 ABOUT HERE

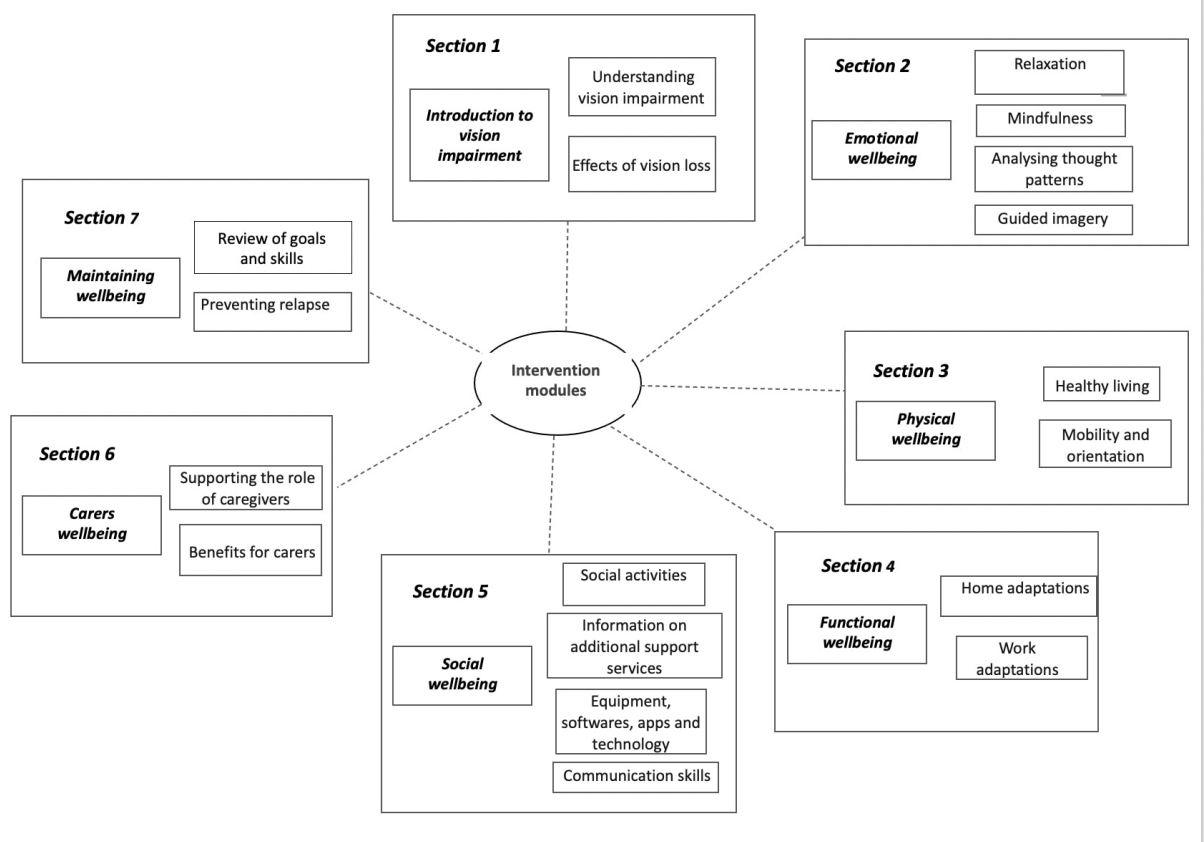


Figure 2. The design suggested for an Internet-based intervention for people with an acquired VI and their carers identified through the Delphi Review.

Discussion

Acquired VI can negatively impact on wellbeing for both the affected individual and their caregiver(s). Although generic support systems are available, they are not always accessible to those with a VI.^{17,18} There is, therefore, a need for an accessible intervention to address wellbeing, tailored for adults with a VI and their caregivers. A guided Internet-based intervention designed specifically for people with a VI and their caregivers is one way of providing such support. This mode of support can be deemed appropriate given the progression made in assistive technologies and the consequent uptake of internet use in people with a VI.⁶⁶⁻⁶⁸ Although significant progress has been made in the utilisation of the internet by people with VI in general, older adults with a VI may still find aspects of using the internet challenging^{69,70} Therefore efforts need to ensure the design of the Internet-based intervention is inclusive and appropriate for all ages.⁶⁸ An important aspect is the inclusion of an introduction section that details how to navigate the intervention. This section should include instructions and suggestions on how to make the intervention more accessible using built in functions within the intervention as well other assistive technologies, such as screen readers. The proposed intervention will also be guided remotely using a secured messaging system by a trained professional to answer questions and provide help as required and to monitor progress. The intervention should also be designed so it can be undertaken jointly by the person with VI and their carer, or independently. Participants will be encouraged to complete the intervention with another person, as this can build rapport through understanding each other's difficulties as well as create better adherence to the intervention.²⁸

The aim of the present study was to inform the design of such an intervention by utilising expert guidance from stakeholders (people with a VI, caregivers of people with a VI and experts with professional experience working and/or treating people with a VI). A three-round Delphi review identified 18 modules which were organised into seven intervention sections that such a design should include, namely (i) *understanding VI*, (ii) *emotional wellbeing*, (iii) *functional wellbeing*, (iv) *physical wellbeing*, (v) *social wellbeing*, (vi) *carers wellbeing* and (vii) *maintaining wellbeing* (Figure 2).

The Delphi highlighted that a section on *understanding VI* that provides accessible information on ocular pathology, visual function and vision is desirable. Explaining acquired and congenital vision loss and how these might impact individuals differently was highlighted as an important component of this section as the processing of this information has been shown to aid acceptance and adjustment to living with vision loss.^{71,72} Adjustment to and acceptance of vision loss may in turn

improve health outcomes and promote psychosocial wellbeing.^{71,72} Although explanations are provided at diagnosis, individuals are unlikely to comprehend all the information well at this point, due to feelings of shock or being overwhelmed.⁷³ Moreover, to further aid the user this section should also direct users to additional support services, such as low vision rehabilitation services, which may aid further adjustment with living with vision loss.^{72,74-76} As there is a high prevalence of depression in adults with acquired VI,^{10,11,77-82} a section on improving *emotional wellbeing* was suggested. This should have a particular emphasis on models such as the grief cycle⁸³ and different individuals' experiences of vision loss. As more focus is placed on ensuring those with VI can manage functionally, emotional needs are not often prioritised.⁴⁷ Similarly, depression in caregivers of those with a VI is highly prevalent due to the burden of care associated with the role^{24,25} and should be addressed. In previous studies interventions providing emotional support elements have shown a decrease in depressive symptoms.⁶¹ Although this module can be completed by both the person with VI and their carer it was recommended that certain elements are adapted to cater for the individual group's emotional needs, with specific scenarios of when and how some of the suggested techniques can be used.

The importance of *self-care* for those with VI was recognised as empowering. Suggestions were made to promote functional adjustments by introducing tools that can assist with mobility and home adaptation, such as magnifiers, large button telephones, talking watches and more recently virtual assistance e.g., Apple's Siri or Google's Alexa. This module would promote self-management strategies to assist with the adjustment to living with a VI and therefore reduce the burden on carers.^{72,74,75,84} It was also suggested that this section should signpost help available from ROVIs and occupational therapists.

Stakeholders also endorsed the inclusion of *physical wellbeing* on the intervention. People with a VI spend 26-48% less time on exercise compared to sighted individuals.⁸⁵⁻⁸⁷ One possible explanation for this could be the fear of falling associated with loss of vision and consequent poor balance.^{86,87} Another possible reason is the concern about hazards such as uneven, slippery or blocked footpaths when navigating outside.⁸⁸ Other barriers to physical exercise include medical problems, lack of transport or time, and inflexibility within the exercise programme.⁸⁹ A physical wellbeing intervention could help overcome these barriers associated with face-to-face exercise and leisure activities. A section regarding ways to increase physical exercise safely for people with a VI was suggested because of the positive effects it has on health and well-being.⁸⁹ Stakeholder responses on the survey strongly advocated the need for good mobility and orientation training. Although

training would be easier if conducted in person an online version could provide information on the different varieties of canes available and who can provide orientation training. Although self-directed physical activity interventions have previously been studied,^{54,90,91} they all need some form of face-to-face intermediary such as home visits or an orientation session. The availability of a fully self-directed physical wellbeing Internet-based intervention, based on home based physical exercises used in previous studies,^{55,90,91} may reduce the burden on face-to-face delivery or intermediary home visits. Further work needs to be conducted in this area. This is also important for people who may be home-bound, as many are during the COVID-19 pandemic.^{92,93}

Peer support and social interactions, such as being part of peer support groups,^{94,95} can promote social wellbeing.^{94,95} Research has shown that social interactions are impeded in those with VI. This may be due to a reluctance to ask for help, perception of being ingenuine (ie. not living with VI), or stigma associated with having a VI.^{47,72} Stakeholders suggested including a section to encourage social wellbeing through providing information on accessing technologies that help communication for those with a VI. This was suggested to highlight the availability of technology features such as utilising software with screen readers and enabling accessible video calling communication, for example, keyboard accessibility, spotlighting participants, automatic transcripts, and rearranging videos.^{96,97} Several studies have reported that using assistive technology can have positive effects on a person's self-identity and confidence⁹⁸⁻¹⁰¹ thereby emphasising the importance of digital social skills.

As it is common for carers of individuals with long term illness to experience health morbidities and feelings of burden,^{27,61} a section aimed at improving *wellbeing for carers* was suggested. Previous interventions for carers of people with long term illnesses, included cognitive behaviour therapy, counselling, problem-solving skills training, coaching with or without a peer support forum and writing/journal therapy.^{26,61} These could be incorporated together with information regarding support systems and government benefits that may be available for them. People with a VI and their caregivers are often unaware of these existing services.^{61,71,72}

A recap of all the information at the end of the intervention was suggested. This was intended to encourage the continued use of any new strategies introduced within the intervention. Stakeholder responses suggested the inclusion of goal setting and subsequent monitoring of progress both through self-assessment and with a ROVI. The long-term effects of such an intervention should be monitored, as there is limited evidence regarding the maintenance of psychosocial and physical

health following intervention completion to date.^{49,60,63} Follow up, or relapse prevention, may encourage *maintaining wellbeing* in the long term.

The stakeholders also proposed that the modules should be self-selected by those with a VI, to tailor the intervention to their symptoms and their needs profile.¹⁰² It is recommended that the intervention has core modules that should be generalisable across different eye diseases and then other optional modules that can be chosen as appropriate depending on a person's specific difficulties and functional ability. For example, the work adaptations and/or home adaptations modules are optional as they may not be relevant to everyone with a VI (see figure 2)

Such an internet-based intervention will only be viable if the content is accessible to those with VI. Stakeholders suggested ensuring the ability to alter font size, colour, contrast, background colour, the inclusion of an audio version, output to braille printer and compatibility with various screen-readers. Furthermore, the avoidance of large blocks of text, in line with guidance of accessibility of digital content for those with VI was highlighted as a necessity.^{103,104}

This study is not without limitations. The panel expert views were all counted equally, irrespective of their level of expertise on the topic and none of the stakeholders had previous experience using and/or referring someone with a VI to use an Internet-based self-help wellbeing intervention.

Conclusion

Overall, the Delphi process positively informed the design of an Internet-based intervention for individuals with acquired VI and their caregivers. Stakeholder consensus was achieved for both the modules to include and for specific content within each module. To evaluate the feasibility and acceptability of the intervention a feasibility trial should be conducted. This will assess recruitment potential, protocol compliance, useability, and functionality of the intervention. It will also provide data that can be used to estimate the sample size needed for future trials that would evaluate cost-effectiveness.

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Table 1

	Total N (%)
People with vision impairment	13 (44%)
Age in years	
Mean (SD)	61 (9)
Age range	48–72
Gender	
Male	6 (40%)
Female	9 (60%)
Cause of vision loss	
Age-related macular degeneration	6 (40%)
Diabetic eye disease	1 (10%)
Glaucoma	2 (15%)
Retinitis Pigmentosa	3 (20%)
Neuro-visual disorders	2 (15%)
Certificate of vision impairment	
Sight impaired	5 (33%)
Severely sight impaired	8 (53%)
Not registered	2 (14%)
Frequency of internet use	
1–10 h	1 (8%)
11–20 h	4 (26%)
21–30 h	6 (40%)
More than 40 h	4 (26%)

	Total N (%)
Carers of people with vision impairment	5 (16%)
Age in years	
Mean (SD)	62 (8)
Range	58–70
Gender	
Male	3 (60%)
Female	2 (40%)
Relationship to person with vision impairment	
Spouse	3 (60%)
Family member	2 (40%)
What kind of support is provided	
Emotional	5 (100%)
Household tasks	5 (100%)
Social support	5 (100%)
Experts who work with people with a vision impairment	12 (40%)
Age in years	
Mean (SD)	52 (8)
Age range	36–61
Gender	
Male	4 (40)
Female	6 (60)
Field of work	
Ophthalmologist	2 (20%)

	Total N (%)
Optometrist ^a	2 (20%)
Rehabilitation officer of vision impairment	3 (30%)
Psychologist	1 (10%)
Speech and language therapist	1 (10%)
Eye clinic liaison officer	1 (10%)
Regional manager of a vision impairment charity ^b	1 (10%)
Years of experience	
Mean (SD)	18 (7)
Range	3–29

a One of the optometrist holds a specialism qualification in low vision.

b This role involves face to face experience supporting the needs and engaging with people with a VI and their caregivers who participate in charity related activities.

Table 2

Conceptual ideas	Ratings Median (IQR)^a	Mean Rank for each group^b	Consensus achieved and agreement (%)
1. Environmental adaptations	VI: 5 (1) Experts: 5 (0.75) Carers: 5 (0)	VI: 13.50 Experts: 16 Carers: 19.50	Yes, 100%
2. Addressing emotional difficulties	VI: 5 (1) Experts: 5 (0) Carers: 5 (0)	VI: 13.23 Experts: 16.50 Carers: 19.0	Yes, 100%
3. Social adaptations	VI: 5 (1) Experts: 5 (0) Carers: 4 (1.50)	VI: 13.81 Experts: 19.50 Carers: 10.30	Yes, 93%
4. Information on local support services in the UK	VI: 5 (0.50) Experts: 3 (1.75) Carers: 5 (0.50)	VI: 19.35 Experts: 9.58 Carers: 19.70	Yes, 77%
5. Information on entitlements and benefits for people with VI and their carers	VI: 4 (1) Experts: 4.50 (1) Carers: 4 (1.50)	VI: 15.38 Experts: 16.29 Carers: 13.90	Yes, 93%
6. Ways to manage stress and anxiety	VI: 4 (1) Experts: 5 (0.75)	VI: 13.04 Experts: 18.88 Carers: 13.80	Yes, 93%

Conceptual ideas	Ratings Median (IQR)^a	Mean Rank for each group^b	Consensus achieved and agreement (%)
	Carers: 4 (1)		
7. Ways to improve low mood such as feeling down or depressed	VI: 5 (0.50) Experts: 5 (0.75) Carers: 5 (1)	VI: 16.00 Experts: 15.63 Carers: 13.90	Yes, 97%
8. Information on how to perform everyday tasks with less help	VI: 5 (0) Experts: 5 (1) Carers: 5 (0.50)	VI: 17.88 Experts: 12.67 Carers: 16.10	Yes, 97%
9. Ways to improve recalling information	VI: 5 (1.50) Experts: 5 (0.75) Carers: 5 (0.50)	VI: 13.12 Experts: 17.13 Carers: 17.80	Yes, 90%
10. Adopting or maintaining a healthy lifestyle	VI: 4 (2.50) Experts: 4 (1.75) Carers: 5 (1)	VI: 15.35 Experts: 13.75 Carers: 20.10	Yes, 75%
11. Improving involvement in activities	VI: 5 (1) Experts: 5 (1) Carers: 5 (0.50)	VI: 14.35 Experts: 15.46 Carers: 18.60	Yes, 97%

Conceptual ideas	Ratings Median (IQR)^a	Mean Rank for each group^b	Consensus achieved and agreement (%)
12. Introduction to sign language and braille	VI: 3 (2) Experts: 3 (1) Carers: 3 (0.50)	VI: 16.46 Experts: 13.25 Carers: 18.40	No, 30%
13. Online chat support forum	VI: 3 (1) Experts: 3 (1) Carers: 4 (1)	VI: 13.35 Experts: 13.88 Carers: 25	No, 23%
14. Emotional wellbeing support for carers of people with VI	VI: 5 (1) Experts: 4.50 (1) Carers: 5 (1)	VI: 15.42 Experts: 14.83 Carers: 17.30	Yes, 93%
15. Impact of vision loss on relatives, friends or carers of people with VI	VI: 5 (1) Experts: 5 (1) Carers: 5 (0.50)	VI: 15.19 Experts: 14.71 Carers: 18.20	Yes, 93%

VI, People with vision impairment; Experts, experts who work with people with a vision impairment; Carers, carers of people with vision impairment.

a 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree.

b The mean rank was calculated for each group to compare whether scores given were significantly different between groups. Lower mean rank numbers represent lower ratings and higher rank scores represent higher ratings.

Table 3

Section	Modules	Ratings Median (IQR)^a	Mean Rank For each group^b	Consensus achieved and agreement
Section 1. Understanding vision impairment	Module 1. Understanding vision impairment	VI: 9 (1) Experts: 9 (2) Carers: 9 (1)	VI: 17.35 Experts: 14.17 Carers: 13.90	Yes, 80%
	Module 2. Introduction to the effects of vision loss	VI: 9 (1.50) Experts: 9.50 (1) Carers: 9 (1.50)	VI: 14.27 Experts: 17.08 Carers: 14.90	Yes, 83%
Section 2. Emotional wellbeing	Module 3. Relaxation	VI: 9 (1) Experts: 9 (1.75) Carers: 10 (1.50)	VI: 14.04 Experts: 15.71 Carers: 18.80	Yes 77%
	Module 4. Mindfulness	VI: 9 (1) Experts: 9 (1.75) Carers: 9 (2)	VI: 15.92 Experts: 15.50 Carers: 14.40	No, 73%
	Module 5. Analysing thought patterns	VI: 9 (1) Experts: 9 (2.50) Carers: 9 (1.50)	VI: 15.54 Experts: 15.17 Carers: 16.20	No, 72%
	Module 6. Guided imagery	VI: 9 (1) Experts: 9 (1.75)	VI: 13.65 Experts: 17.46	Yes, 75%

Section	Modules	Ratings Median (IQR) ^a	Mean Rank For each group ^b	Consensus achieved and agreement
		Carers: 9 (1)	Carers: 15.60	
Section 3. Physical wellbeing	Module 7. Healthy living	VI: 10 (1) Experts: 10 (1) Carers: 9 (1.50)	VI: 15.88 Experts: 17.33 Carers: 10.10	Yes, 76%
	Module 8. Mobility and orientation	VI: 9 (2) Experts: 9 (1.75) Carers: 9 (1)	VI: 15.62 Experts: 13.96 Carers: 18.90	Yes, 81%
Section 4. Functional wellbeing	Module 9. Home adaptations	VI: 9 (1) Experts: 8.50 (2.50) Carers: 9 (1)	VI: 18.19 Experts: 11.50 Carers: 18.10	Yes, 79%
	Module 10. Work adaptations	VI: 9 (1) Experts: 9.50 (1.75) Carers: 10 (3)	VI: 16.08 Experts: 15.25 Carers: 14.60	Yes, 76%
Section 5. Social wellbeing	Module 11. Social activities	VI: 9 (1.50) Experts: 9 (1) Carers: 9 (1)	VI: 14.0 Experts: 17.38 Carers: 14.90	Yes, 78%
	Module 12. Information on additional support services	VI: 9 (1)	VI: 17.31	Yes, 77%

Section	Modules	Ratings Median (IQR) ^a	Mean Rank For each group ^b	Consensus achieved and agreement
		Experts: 9 (2.75) Carers: 9 (1)	Experts: 14.08 Carers: 14.20	
	Module 13. Equipment, softwares, apps and technology	VI: 9 (1) Experts: 9 (1.75) Carers: 9 (1)	VI: 16.15 Experts: 15.63 Carers: 13.50	Yes, 80%
	Module 14. Communication skills	VI: 9 (1) Experts: 9 (1.75) Carers: 9 (1)	VI: 12.62 Experts: 17.0 Carers: 19.40	Yes, 79%
Section 6. Wellbeing for carers	Module 15. Supporting caregiver of people with vision loss	VI: 7 (2) Experts: 7 (1.75) Carers: 8 (1)	VI: 14.19 Experts: 16.38 Carers: 16.80	Yes, 72%
	Module 16. Mindfulness (duplicate of module 4)	VI: 7 (2) Experts: 7 (1.75) Carers: 8 (1)	VI: 13.04 Experts: 15.25 Carers: 22.50	No, 24%
	Module 17. Relaxation (duplicate of as module 3)	VI: 8 (2) Experts: 7.50 (1) Carers: 7 (1)	VI: 18.08 Experts: 13.71 Carers: 13.10	No, 10%

Section	Modules	Ratings Median (IQR) ^a	Mean Rank For each group ^b	Consensus achieved and agreement
	Module 18. Benefits and support for carers of those with vision loss.	VI: 9 (1) Experts: 9 (1.75) Carers: 9 (0.50)	VI: 12.19 Experts: 17.38 Carers: 19.60	Yes, 76%
Section 7. Future planning	Module 19. Review of the goals	VI: 7 (1) Experts: 8 (1.75) Carers: 8 (1.50)	VI: 13.04 Experts: 17 Carers: 18.30	No, 20%
	Module 20. Review of new skills and information	VI: 9 (1.50) Experts: 9 (1.75) Carers: 9 (2)	VI: 15.12 Experts: 16.96 Carers: 13	No, 60%
	Module 21. How to prevent relapse	VI: 9 (1.50) Experts: 9 (1.75) Carers: 9 (1)	VI: 16.38 Experts: 14.42 Carers: 15.80	Yes, 75%

VI, People with vision impairment; Experts, experts who work with people with a vision impairment; Carers, Carers of people with a vision impairment.

a 10 = very important, 9 = important, 8 = less important, 7 = not important, 6 or less = not important at all.

b The mean rank was calculated for each group to compare whether scores given were significantly different between groups. Lower mean rank numbers represent lower ratings and higher rank scores represent higher ratings.

Table 4

Modules	Ratings Median (IQR)^a	Mean Rank for each group^b	Consensus achieved and agreement Round 2	Consensus achieved and agreement Round 3
Module 4. Mindfulness	VI: 10 (1) Experts: 9 (0.50) Carers: 9 (1.50)	VI: 15.82 Experts: 11 Carers: 13.40	No, 73%	Yes, 84%
Module 5. Addressing thought patterns	VI: 9 (0) Experts: 9 (1.25) Carers: 9 (0.50)	VI: 14.82 Experts: 11.95 Carers: 13.70	No, 72%	Yes, 77%
Section 6. Supporting carers: include only supporting the role of carers and benefits for carers modules	VI: 13.45 Experts: 11.80 Carers: 17	VI: 13.45 Experts: 11.80 Carers: 17	No, 72%	Yes, 100%
To merge module 19 and 20 Review of the goals set at the start of the intervention	VI: 9 (0) Experts: 10 (1) Carers: 9 (0)	VI: 10.64 Experts: 18.40 Carers: 10	No, <60%	Yes, 94%