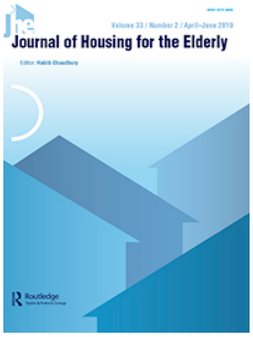

Journal of Housing For the Elderly

ISSN: 0276-3893 (Print) 1540-353X (Online) Journal homepage: https://www.tandfonline.com/loi/wjhe20

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To cite this article: Mary Butler, Keri McMullan & Susan E. Ryan (2019) Lighting Prescriptions for Low Vision, Journal of Housing For the Elderly, 33:2, 189-203, DOI: 10.1080/02763893.2018.1534175

To link to this article: https://doi.org/10.1080/02763893.2018.1534175

Published online: 25 Apr 2019.

JOURNAL OF HOUSING FOR THE ELDERLY
2019, VOL. 33, NO. 2, 189–203
https://doi.org/10.1080/02763893.2018.1534175

Lighting Prescriptions for Low Vision

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ABSTRACT
This project explored ways of enhancing the lighting of older adults with Age Related Visual Loss. The Visual Functioning Questionnaire (25) was administered at the start of the project and home assessments were carried out mid-way by occupational therapy students. Firstly, findings were analysed using Qualitative Data Analysis Software, and secondly by the Qualitative Analysis Guide of Leuven. Following this, each participant was provided with a lighting prescription devised by experts. Findings indicated that the participants were able to use both this information and that from the focus groups to meet their lighting needs, particularly drawing on LED technology.

KEYWORDS
low vision lighting; enhancing vision; vision education programme; assessing lighting needs

Introduction

This article from New Zealand presents an adult educational program for those with low vision that focuses on lighting, because there are significant difficulties in ensuring that older people can access lighting that is sufficient for their needs. In the first place, it is hard for people to know where to obtain information about how to optimize indoor lighting to compensate for age-related vision loss. Lighting stores rarely provide information about changes in recommended lighting levels with age, or on the positioning of lamps to increase the light available and to avoid glare. Optometrists may suggest the need for improved lighting and contrast, but generally do not have information about specific products. For some people, it may be possible to hire an architect, an interior designer, or an electrician with lighting design expertise, but this type of service is expensive and such skills are not readily available. Occupational therapists are expected to do home assessments that consider the safety of older people, but at present, few consider lighting as part of an overall home assessment (Perlmutter et al., 2013). Some publications provide details about the recommended levels of home lighting for older persons (Illuminating Engineering Society of North

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America, 2017), but these can be difficult to access for the general public. Fortunately, there are recent publications developed by sight loss services, notably by the Pocklington Trust (Huszarik, Hodgson, & Watson, 2018), which provides an excellent overview of key messages about inexpensive lighting solutions for older adults. This book provides the framework for the educational program described in this study.

However, even if the information were freely available, it could be difficult to make changes since older people with age-related vision loss (ARVL) often express satisfaction with deficient levels of lighting (Eilertsen, Horgen, Kvikstad, Falkenberg, & Helle, 2016). By the age of 60 years, the eye needs 3 to 10 times as much light to see as clearly as a 20-year-old, and this continues to accelerate with increasing age (Nylen, Favero, Glimne, Tear Fahnehjelm, & Eklund, 2014). Older adults with ARVL tend to be unaware of how light levels can affect their vision and their capacity for functional performance of activities of daily living (ADLs). The result is that the lighting levels in the houses of older adults with low vision consistently fall below recommended levels (Bakker, Iofel, & Lachs, 2004; Bhorade et al., 2013; Chu, Kaldenberg, & Huefner, 2009; Eilertsen et al., 2016). For example, in one study, vision measured in the clinic was considerably better than vision measured at home, caused by the fact that home lighting is below recommended levels for 85% of the participants (Bhorade et al., 2013). Overall, we know that lighting is one of the simplest and most efficient ways to improve performance in people with low vision, to prevent falls, and to improve daily function and overall quality of life (Paul & Yuanlong, 2012).

Normal structural deterioration associated with age, including presbyopia, reduced pupil diameter, a decrease in accommodation, and thickening and yellowing of the lens (Nylen et al., 2014), causes an increased need for lighting. In addition to these changes, there are visual impairments often associated with aging, including age-related macular degeneration (AMD), glaucoma, diabetic retinopathy, and cataracts. Also seen in older adults are neurovisual deficits from acquired brain injury such as stroke and tumor (Mogk, 2011). These various eye conditions differ in illumination needs and preferences, but there are some trends evident. For example, individuals with macular degeneration benefit from increased lighting whereas those with cataracts show less benefit (Boyce, 2003). However, even within a single condition like AMD, there are significant variations in preferences (Haymes & Lee, 2006). The recommendation tends to be that lighting should match personal preferences since there is no single illumination type, strength, or hue that is universally acceptable for particular conditions (Evans, Sawyerr, Jessa, Brodrick, & Slater, 2010; Schoessow, 2010).

Furthermore, the change in technology underpinning lighting is one reason that older people can find it difficult to make necessary changes.

Luminaires now include compact fluorescents, incandescents, halogens, and LEDs (light-emitting diodes). These lighting types have increased the range of differences between lights along parameters of color, light intensity, and sustainability. The dramatic increase in choices available makes it difficult for older people with ARVL to make decisions about personal preferences. They must now understand not only that there is a different technology, but that the science underpinning this technology translates to different key terms on the packaging. For older adults the term "watts" was once associated with levels of brightness. Now, although there is little consistency in the terms used in New Zealand, generally the brightness of the light is described using lumens, rather than watts, while the color of light is expressed using kelvins, rather than "warm" or "cool." There has effectively been a lighting revolution since the mid-1990s when the first "white" LED was introduced. For example, white LEDs have now increased in efficiency from a few lumens per watt to more than 140 lm/W, which is more than all other traditional electrical light sources. This tension has created a transitional phase where adult educational programs are necessary to raise awareness of lighting needs among and for older people with ARVL to deliver better quality lighting to this population.

Access to adequate lighting is a public health issue (Butler, 2017) and there are at least two potential ways to tackle it. A focus on behavioral change can be brought about through rehabilitation interventions such as lighting clinics. Adult education, however, has more of a focus on empowerment of older people to meet their own lighting needs. Low vision services are lacking in New Zealand (Duckworth & Grow, 2015). Moreover, even in countries where vision rehabilitation services are prevalent, there can be a gap in the understanding of health professionals about how lighting can help older people with ARVL (Eilertsen et al., 2016). There is, therefore, a pressing need for educational research that establishes effective ways of managing the learning needs of older people with ARVL. In this research, we trialled an educational project aimed at meeting this objective. The Pocklington Trust (Huszarik, Hodgson, & Watson, 2018) has produced educational material that can be used by occupational therapists and the lay public, and the reader is referred to this booklet for the kinds of information that was provided to workshop participants. This study aims to establish how providing and sharing simple information about lighting can be used to design and set up educational workshops and lighting prescriptions for people with ARVL.

Method

We used qualitative, interpretive description because it emphasizes interpreting data in ways that guide a health professional toward a critical

Table 1. Demographic participant data.

	Gender	Age (years)	Condition	VFQ25
1.	f	84	Myopia	94
2.	f	70	Myopia	90
3.	f	75	Myopia	86
4.	f	83	Glaucoma	46
5.	f	87	Glaucoma	65
6.	f	89	Glaucoma Cataracts Macular degeneration	34
7.	m	87	Macular degeneration	69
8.	f	90	Macular degeneration	60
9.	f	60	Macular degeneration	76
10.	f	96	Macular degeneration	41
11.	f	78	Macular degeneration	60
12.	m	80	Macular degeneration	64
13.	m	85	Macular degeneration	52
14.	m	91	Macular degeneration	71
15.	f	74	Macular degeneration	76
16.	f	76	Cataracts	79
17.	m	77	Cornea scarring	64
18.	m	71	Retinitis pigmentosa	75

response to a complex experiential visual health care question (Thorne, Kirkham, & O'Flynn-Magee, 2004). We obtained ethics permission for the study from Otago Polytechnic in August 2016 and purposively sampled from a range of community groups. Eighteen people volunteered, and each one was interviewed over the phone using the VFQ25 (National Eye Institute, 2000) to establish a baseline understanding of functional status (see Table 1). There were three audio-recorded focus groups both pre- and postintervention, and we recorded 10 hours of data. Some family members came to the postintervention groups. Each participant had a home assessment using the Home Environment Lighting Assessment (HELA) (Perlmutter et al., 2013). Their lighting needs were also assessed using the LuxIQ system (Borden, Klein, Goodrich & Patten, 2014), which is a portable calibrated lighting system that enables testing of color and intensity lighting preferences.

An expert panel reviewed the assessments, and the research team developed a lighting prescription for each participant. The team communicated with daily meetings and communication software (SLACK) for clinical and reflexive notes. Transcripts were read repeatedly and coded using Quirkos software. Analysis phases followed the procedures outlined by Dierckx de Casterlé, Gastmans, Bryon, and Denier (2012). Themes were presented to support groups on two following occasions for member checking. The first author led all phases (MB), the second author took part in the focus groups and started the literature review (KM), and the third author engaged in the subsequent phases of analysis (SR).

Findings

Although the lighting prescriptions were personalized, most of the recommendations were very simple. These included the use of brighter bulbs;

LED ceiling buttons (a dish-shaped diffuser luminaire); adjustable task lamps for table and floor; and strip lighting. For example, a recommendation for one client was replacing all ceiling lights with LED at 1400 lumen and 6500K (north light). The preferred task lighting for this client was 3500 lux, compared to the usual recommendation of 200–1000 lux for reading (Figueiro, Sahin, Wood, & Plitnick, 2016). The color of the light favored by clients was variable. Other clients could not tolerate bright lights and suggestions were made to address issues of glare. Lighting was provided from multiple sources, rather than a single point, in order to avoid contrast between light and dark; lighting was also positioned for tasks, for example, over the armchair or on a table; bright lighting was also frequently recommended in the kitchen, particularly for cooking and washing up. Solutions for glare included getting darker curtains and ensuring that lampshades covered the light.

The analysis of focus-group transcripts led to the development of three themes:

1. Recognition that there is a problem with lighting.
2. Solving a problem with lighting.
3. Putting solutions into action.

Theme 1: Recognition that there is a problem with lighting

Participants expressed disappointment that they had not previously been able to get the help that they needed. Even when family members had tried to help, it was often not exactly what they needed. One participant described how her stepdaughter had bought her a standard lamp, but the actual bulb was the wrong color and was too bright. Some of the participants also took the advice of the local light shops but had less than positive experiences:

> I've got hideous lights on the ceiling, which I had put in because the man convinced me that I needed them, but I hate it, they are the ones that start off very dim and get brighter, and they're hopeless!

They struggled with knowing who they could trust with information about lighting, and several of them had stories about expensive mistakes:

> To me, all the light shops are parts of chains, and all they want to do is sell a light.

> We had our house built about 13 years ago. Had lots of these downlights put in, but apparently, they were all a real risk of fire because of transformers.

People expressed that they felt let down by lighting shops, which seemed to promise expertise but gave poor advice:

> We've probably benefited more from an experienced electrician in more ways than we did from the so-called knowledgeable person at (named shop). After all, they're there to sell you as many lights as they can.

In this case, a family member described some of the processes that they went through getting the correct lighting for his mother:

> We just have to do trial and error, because looking at something in a lighting shop is so remote from your own experience. Different distances, ceiling heights, different colors of surroundings, and it's pretty hopeless until you actually get into your context.

As the research took place in an older settlement in the south of New Zealand, many participants lived in dark houses with older style furnishings and electrical equipment generally:

> I've got an older, quite dark home. If I relied on the central lighting, I couldn't do a lot of the jobs that I do.

Participants were highly motivated, and they came to the group with questions about particular problems:

> I'm trying to find a better thing. A house basically built '51; it's got a lot of these multi-lights. Basically, it's got a lot of lights, which are a maximum of 60 watts, because they're in an enclosed thing. Now 60 watt doesn't do anything at all. I don't want to change to fluorescent tubes.

Participants seemed to be aware that there was new lighting technology, but this increased their feelings of uncertainty. In the past fluorescents would have been considered the brightest light available, but they knew that this was no longer the only solution. There was a sense of confusion about the new alternatives and what LED lighting might contribute:

- *LED lighting, it's brighter, isn't it?*
- *Are they better, LED, than what I'm talking about, the energy saver?*
- *It used to be that watt equated to the amount of light!*
- *I need those LED light bulbs or something. I'd like to know what size, I don't know what size to get.*

The participants also expressed some confusion about where they could best place their lights so that they would work to maximum effect:

> Where do you put it? Should it be behind you? Where does it work best for me? I can't work it out.

Several participants described the gradual dimming of visual and occupational capacity because they did not have enough lighting. One by one they faced the loss of precious activities:

> You know I have trouble washing the dishes, and I look at a spoon and wonder whether I've washed it properly or not, and I think I need better lighting over the sink.

The culture of New Zealanders includes involvement in productive occupations at home like sewing, knitting, reading, cooking, and computer work, and they found it hard to lose these activities:

> I find that's not enough light if I want to do anything. So now, I can't see to do my knitting.

Participants also had problems with insufficient ambient lighting, which led to the possibility of trips, slips, and falls. For example, there were several descriptions of problems getting around the house at night:

> I really need a much better way of getting about the bedroom at night. I just have a very small flashlight and sometimes I stumble against the bed and have trouble getting to the bathroom.

Participants described becoming completely disoriented at night, even though they were in their own home.

> What happened to me one night, I don't know what the story was, but I wanted to get up and go to the bathroom and that, and I lost my sense of direction. I had my flashlight, and that flashlight wouldn't show me how to get out of the bedroom. I just couldn't work my way out of my bedroom.

They also described how the lack of lighting led to significant injuries:

> The time I walked into a suitcase was the low light that hadn't come on yet … I ended up with my foot up for six weeks while we waited for the skin to heal and stuff.

Sometimes the problem was about not having enough light in the right places. For example, they might not have enough outlets in the house, which determined where this participant could sit to read:

> I can't actually sit in an armchair and read. I have to sit at the table or go to bed just because all the other lamps are used in the kitchen and roundabout.

Often lighting was not in the right place, and several participants described how they moved tasks to places where they could find a brighter light. They would move the job from room to room as they searched for a place where they could see, and this contributed to the slow pace of activities:

> To use a recipe book, the light in the kitchen isn't enough for me, so for each line, I have to go over to the table, read that (line), back I go and do that (instruction). Everything takes a while in my place.

Participants described problems with illumination in both public and private spaces. For example, the local support group advocated for increased

lighting near the bookshelves with the large print books. Unfortunately, people would unplug the lights to charge their digital devices and not put them back. Another problem was restaurants where the dim ambient lighting was used to enhance the social atmosphere but made menus unreadable.

Energy usage and sustainability was an important consideration for the participants. Over a decade ago, compact fluorescent technology was advocated by the government. These luminaires did not light up quickly, which is dangerous for older eyes that experience visual shock and temporary blindness with rapid changes in light levels; neither did these luminaires last as long as had been predicted, and this led to a loss of trust in public messages about lighting. A participant described how she:"got rid of them; they were really bad. They didn't light up enough."

For most of the older participants, the physical act of plugging in plugs and putting bulbs into ceiling sockets was problematic. Some had problems with poor balance and could no longer climb ladders. Arthritic hands meant that they found it hard to grasp the bulb, and sometimes the bulb would break as they put it in. From all the comments in this first theme, it was clear that these older participants had recognized and shared several problems about lighting among them.

Theme 2: Solving a problem with lighting

Members of the focus groups were keen to take the opportunity to share solutions that worked for them and also to check out their reasoning about new solutions with other participants.

Using daylight. Knowing the environment they were in was important, and they were aware of the functional capacity they gained from attempting to do things at different times of the day.

> You see with the sunlight now, with the summer, the sun comes in my kitchen window at the sink at nighttime when I'm doing the dishes.

Daylight was an important way of increasing the overall amount of lighting available, but it did mean that the participants tended to do less at night. One participant described how he did his reading with his back to the window to enhance the light given by a LED task lamp with two 2000-lumen bulbs.

Reducing glare. They were aware of glare as something requiring a variety of solutions. Some wore sunglasses in the house or a wide-brimmed sunhat to shade their eyes. Others found environmental solutions:

> Even daylight can be too strong for me, and I got my daughter to put up a green net curtain.

Solutions for night mobility**.** One of the areas of greatest interest for the participants was finding solutions for night lighting. One person discovered that a sensor light was helpful at night:

> What I got myself was the most useful thing, was just this sensor. Put it on the floor, so it doesn't shine over the whole room or hang it off some article of furniture in the room with this thing. It goes off in 20 seconds, and that's very useful.

Flashlights were used for a range of activities and operated as mini-task lamps, as well as being the improvised lighting of choice at night. Participants described leaving 10 flashlights in different places around the house so that they never had to look far for one. They described using flashlights in a range of ways to "read labels in the shop—including reading the labels on light bulbs or to help get the key in the door."

Solutions for activities**.** Many participants loved to sew or knit. They had already come up with the solutions they had tried, which they shared. Color contrast was used, for example, using black cotton on white material or color- contrasting wool and knitting needles. One participant came up with a solution to use a task lamp specifically for reading her knitting patterns:

> I bought an old music stand like they have at the national orchestra. I knit these shawls and, like, there's 23 rows in a pattern. And when I'm reading it, my eyes are dancing from one line to another, and I used to make mistakes. I got A3 paper and turned it around on its side, and wrote out each pattern row in big black print, and put it on the music stand and shined the light on that. It's been wonderful because I'm looking straight ahead and I'm only looking at one row at a time.

In other cases the use of button lights or a dish-shaped diffuser luminaire in the bathroom ceiling enabled this space to become useful for doing appropriate activities:

> It just made an enormous difference for me that I can actually see in the mirror to put in the eye drops.

Through using the LuxIQ, some participants began to understand the colors of light that suited them best for doing particular activities:

> She was showing me, adjusting the white/yellow, when I had a piece of crochet. I felt the yellow was more comfortable for me.

One participant described nonvisual effects of lighting, and how the increase in lighting affected her general alertness:

> It's absolutely fantastic because it's like a bright sunny day all evening. I don't fall asleep so much.

There was some discussion about the advantages of using task lamps with magnifiers. Some participants were disappointed with the magnifier, but one person found that it enabled her to remove splinters from her

finger. This kind of delicate work is something that a number of the participants found problematic. Thus, the sharing of solutions within the group was the trigger for change both in their lighting knowledge and in their practical lighting needs.

Theme 3: Putting solutions into action

The "lighting prescriptions" were found to be especially useful. They were used to communicate with lighting shops, and one, in particular, used the "lighting prescriptions" to deliver precisely what was needed, down to the color of the lampshade. This shop was involved in consulting about the project, and the feedback about this shop was much more positive than feedback about other lighting shops:

> She told me to take the 24-watt power that gives out the equivalent of a 100 watt light, so instead of the three old-fashioned 60 watts, which was the largest I could have in these little glass globes, I now have the equivalent of 300 watts.

There was a lighting shop that agreed to act on the lighting prescriptions. This meant that they could provide a full service in a single visit, without charging anything for the consultation:

> X offered to come down and do it for me, to install the kitchen one for a moderate price and it was only $50.

The participants were all pensioners and finance was a significant issue when it came to making any changes in lighting. They were therefore pleasantly surprised by the working relationship with this shop:

> I thought that was cheap because it would probably have cost me that just for the electrician to come down and do the connection without the price of the bulb.

This kind of response gave confidence to others who were hesitating about making changes. There was also some added benefit from peer support, where they were able to encourage each other to consider the cost worthwhile:

> If you can manage the cost though, what does it matter when it improves your ability to cope and see, what matter is the cost?

The arrangement where the lighting shop used the "lighting prescription" was invaluable because it gave people confidence about making purchases. One of the interesting findings of the study was how quickly families came on board with help, once they had a prescription to follow. Several family members came along to the second focus group because they also wanted to learn:

> The reason I'm here is to try and learn some tips to see if we can improve the lighting at Mom's house. We've already done quite a bit, but any knowledge we can get would be quite useful

Overall, the participants were very pleased with this project and their new learning:

> I've appreciated very much the opportunity to deal with this, because we've been struggling around now for quite some time, trying to resolve these things, trying other ways, but nothing just seems to be right. Now we've got really good information that we can now work from, so the project as far as I'm concerned has been excellent.

Discussion

There is a lighting revolution underway, but almost nothing has been done to translate the burgeoning literature into something that could improve the lives of people with low vision. Most of the recommendations described in this project were very simple and relatively inexpensive: brighter luminaires; LED ceiling buttons or dish-shaped diffuser luminaires; adjustable angle-poise task lamps for table and floor; and strip lighting. Solutions for glare included sunglasses, curtains, and lampshades. It is important to remember that solutions can be simple and cheap, even though the information about lighting, in general, can be overwhelming in its complexity. We are aware that there are many additional variables that would be considered by a lighting expert—for example, direct/indirect/semidirect lighting; room cavity ratios; coefficient of utilization of fixture; angle of incident light producing glare; and the spacing of fixtures. However, for occupational therapists and other health professionals to make simple recommendations, it is argued that the level of knowledge indicated here can make a significant difference to quality of life and safety of older people with low vision. This article indicates that key principles of lighting, currently summarized in accessible format by the Pocklington Trust (Huszarik, Hodgson, & Watson, 2018), can be used by health professionals. It is important for health professionals and families to be confident that they can advocate with confidence for these simple solutions, and this study demonstrates how there can be effective knowledge translation using a key resource that is readily available. We argue that it is not realistic or desirable to use expensive lighting consultants for a group of people who are often on minimal income. This work is particularly important in countries like New Zealand where there are inadequate services for people with low vision. We therefore strongly recommend that occupational therapists doing home assessments should draw on the information available in the Pocklington Trust booklet about lighting.

The research involved trialling several educational processes, including an initial workshop, followed up by a debriefing workshop. The workshops proved to be an ideal format for learning about lighting. Participants were able to share with each other how lighting could improve their functional vision. The LuxIQ was useful as part of the workshop because it provides a talking point about the lighting required for doing specific tasks like reading. Although convenient and quick, it is not strictly necessary and could be replaced with an equipoise lamp and an array of luminaires. The provision of a variety of luminaires and task lamps was also an effective way of generating conversation about different solutions, including the inverse square law of light.

For most of the participants, the home assessment and development of a personalized lighting prescription made up an important component in demonstrating that a problem existed and that a solution was possible. One of the proposals from this study is that home lighting assessments could be carried out as a stand-alone contracted service in situations where there are no lighting clinics or low vision services available for older people. This would be a significant public health measure, and it would be cost-effective if it could prevent any falls. Hip fractures are the most common fracture after the age of 75 years (Rubenstein, 2006), which is the time when visual impairment also increases. The cost of a hip fracture resulting in a 3-week stay in hospital is estimated at $47,000 (NZ), while a hip fracture that leads to admission to a rest home is estimated at $135,000 (De Raad, 2012). Therefore prevention of a single fall leading to a fractured hip is likely to pay for a significant part of a preventive service aimed at providing lighting prescriptions for the over-70s in New Zealand.

A further recommendation from the study is that all occupational therapists should integrate lighting into their home assessments. Occupational therapists are in an ideal position to do this as they carry out generic home assessments as part of their role. However, we know that currently occupational therapists rarely include lighting in their home assessments.

There are specialist lighting assessments available, such as the Home Environment Lighting Assessment (Perlmutter et al., 2013), but this is relatively complex to use and depends on a high level of clinical knowledge to create recommendations. We, therefore, recommend that current best practice for occupational therapists should be the lighting guidelines provided by consumer groups, for example, the Pocklington Trusterapists (Huszarik, Hodgson, & Watson, 2018). This currently provides a useful guide to begin thinking about lighting. However, it requires some adaptation to be used as an assessment by occupational therapists. Also, there is a lighting revolution underway, and it is important that such resources are updated often in order to include the latest lighting that is on the market. The availability of

products also varies between countries, and a recommendation would be to adapt the material from the Pocklington Trust to the conditions in a specific region. This material can also be used as the basis of short courses provided to health professionals in developing lighting prescriptions. These short courses might also be made available to lighting shops that want to work more closely with health professionals.

Previous negative experiences have led to a loss of trust in lighting shops in New Zealand for many of the older adults with ARVL. An unexpected outcome of this study, therefore, was how the lighting prescription led to the development of a relationship with a lighting shop. The researchers and the lighting shop established a mutually beneficial relationship, where the lighting shop got the business, and the researchers had assurance and feedback about the utility of the lighting prescriptions. A further recommendation from the study is that lighting prescriptions will work most effectively in the context of this kind of relationship.

The transferability of these findings may be limited by the fact that some of the participants were recruited from a low vision support group, and may have therefore been particularly motivated to address issues of low vision. However, participants were also recruited more widely from a range of other community groups, and it is unlikely that the support-group members determined the overall tone of the group. The context of this research is a country where there are almost no low vision services, and the findings may be transferable to countries where low vision services and lighting clinics are available. However, the conclusions may have utility in developing countries. Lighting prescriptions make good sense in the New Zealand context, and we suggest further research to test the extent to which older adults with ARVL will make use of lighting prescriptions provided by occupational therapists.

Arguably, the adult educational lighting workshops may have only been effective because of the inclusion of the home lighting assessment. Therefore, there is further research required to explore whether people with ARVL will make changes in their lighting based on the information gained in a workshop. Do they need an individual housing assessment and lighting prescription to bring about the necessary changes? Also, it would be helpful to research the feasibility of integrating lighting assessments into occupational therapy home assessments.

Conclusion

People with ARVL are living in homes that are darker than they should be for functional performance, safety, and overall well-being. Access to adequate lighting is a public health issue, and without good advice, people will not make changes, or they will make changes that involve expensive

mistakes. This project adds to current knowledge by demonstrating a cost-effective way of providing education to groups of older people with ARVL. The combination of home assessment and lighting prescription, with workshops and a cooperative lighting shop, can potentially provide an effective method for improving the lighting situation for many people with ARVL. These methods can begin to address the need for all older people with ARVL to have adequate access to lighting, even in situations where there are no low vision services.

Funding

This project was funded by the Participatory Science Platform in 2016 to teach older adults about the science of lighting.

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