This report presents findings from a recently completed review of research on daylighting and windows in the homes of people with sight loss, conducted by Dr Paul Littlefair of the Building Research Establishment (BRE).

The aims of the study were:

- To review the literature concerning daylight and windows in homes, identifying the benefits and penalties in relation to people with sight loss.
- To identify gaps in knowledge and suggest how to address them, with a view to developing recommendations for designing future homes, and improving existing homes of people with sight loss.

The review found that:

- Current design guidance contains little material on daylighting for people with sight loss.
- Controlled daylight can give high light levels and an even spread of light which is helpful to partially sighted people.
- The variation of daylight adds interest and enables people to maintain their daily rhythms of sleep and alertness.
- Daylight and sunlight can however cause glare, which needs to be controlled by appropriate shading devices.
- Research is required to determine the needs and preferences of people with sight loss for the amount of daylight in the rooms of their home, type of blind, visual privacy and lighting controls.
Background

The project was based around a comprehensive literature review to establish previous work in the area of daylighting and sight loss. This included consultation with key researchers in the field. BRE also carried out interviews with a small number of people with sight loss to discuss their attitudes to daylight and sunlight, and requirements for them.

Based on these findings, BRE prepared recommendations for further research to help develop design guidance on daylighting for homes of partially sighted people.

Current design guidance

In the UK there is no general statutory requirement for a particular daylighting level. Non-mandatory recommendations on daylighting in buildings are given in various standards and design guides, but none of these documents specifically mentions daylighting for people with sight loss.

There are existing publications, including some by Thomas Pocklington Trust, which give guidance on lighting for people with sight loss and for older people. These have some material on daylight, but this is largely limited to simple guidance on making the most of daylight in an existing dwelling.

The benefits of daylight

Daylight has a number of advantages which should benefit partially sighted people. It can give much higher illuminances than the relatively low light levels that domestic electric lighting generally provides. This can help in the performance of detailed visual tasks. Compared to electric task lighting, daylight is often more comfortable because it is more diffused and lights a wider area, avoiding uncomfortable contrasts between the task and its background.

These high illuminances, coupled with the variation of daylight during the day, help to maintain the body’s rhythms of sleep and alertness. They stop the body producing melatonin, a hormone that causes sleepiness, and stimulate the production of serotonin, which can reduce the symptoms of depression. For people with a visual impairment, high illuminances are particularly needed, because their eyes are likely to be less effective at sending the required signals to the pineal gland, which controls these hormones.
The variation of daylight and sunlight, both during the day and within shorter time periods as sky conditions change, also adds interest to the visual environment. Windows provide contact with the outside, which is particularly valued by those with sight loss. Even people with only the basic ability to resolve light and dark can detect changes in the weather and movement of the sun. Windows also give non-visual cues because changing conditions outside alter the acoustic and thermal environment. The presence of a window can help people orient themselves within a room or building. Windows can aid wayfinding in circulation areas.

Compared to tungsten light, daylight contains much more light in the blue end of the spectrum. This can aid people whose sensitivity to blue light is reduced (for example by age related deterioration which causes yellowing of the lens). Blue light is also particularly effective at resetting the body’s clock and stopping melatonin secretion. Daylight has excellent colour rendering and a high colour gamut, which means that objects appear in their vivid, true colours.

**Daylight, sunlight and glare**

Daylight, and especially sunlight, can also be a source of glare. This is a particular problem for those with certain kinds of sight loss such as cataract. Blinds or curtains can control glare; ideally the shading device should admit a comfortable level of diffuse light while cutting out the glare source. Blinds should be better at this than curtains, although it is not clear what the optimum type of blind is. Current guidance for partially sighted people recommends vertical louvre blinds, but they require frequent adjustment during the day as the sun moves round. Horizontal venetian blinds require less adjustment, but need to be kept almost shut to control low angle sun. The interviews suggested that people with sight loss have a range of lighting needs and sensitivity to glare, so providing good control over daylight and sunlight is a key issue.

Contrast between light and dark areas can also be uncomfortable or disabling. There may be very bright areas near a window contrasting with dark, gloomy parts of the interior. Current daylighting guidance does address these issues. In their homes, partially sighted people may appreciate some spatial variation in the amount of light provided; they can take difficult visual tasks to the window, or relax in the more subdued areas of the room.
Future research and development

Because of the benefits of daylight, homes with higher levels of daylight provision are likely to be preferable for people with sight loss as they need more light to perform visual tasks and maintain their body’s daily rhythms. In addition, groups such as older people and those with disabilities are more likely to be in their homes for more of the time during the day. However there is no guidance on how much more light should be provided. Further research is therefore recommended on the preferences of people with sight loss for the amount of daylight in their homes, including kitchens, which in some new housing may not have a window at all. Having big windows may cause some privacy issues, and it would be useful to find out whether people with sight loss are more, or less, concerned about visual privacy than the general population.

Daylight and sunlight can also cause glare, so effective shading devices are important. It would be good to establish the type of blind that people with sight loss prefer, so as to give appropriate design guidance.

Even during the day, electric lighting may be required as well as daylight, so that people with sight loss can have extra light when they need it. Different people have different requirements for lighting, and good lighting control enables them to tailor supplementary lighting to their own individual needs and the time of day. Guidance is available on the best design of manual switching. However it is unclear whether automatic controls, which might be used in communal areas, are suitable for people with sight loss. User feedback from places where they have been installed would help engineers and facilities managers choose the best type of lighting controls in different areas.

Finally, dissemination work is required so that future codes and standards on daylighting do address the needs of people with sight loss.
Conclusions

This has been the first study specifically to address the need for daylight in homes of people with sight loss. Current design guidance contains little material on this issue.

The study found that daylight can give high light levels and an even spread of light which can be helpful to partially sighted people. The variation of daylight adds interest and enables people to maintain their daily rhythms of sleep and alertness. However daylight and sunlight can cause glare, which needs to be controlled by appropriate shading devices.

Further research is recommended in a number of areas: preferences of people with sight loss for amount of daylight in their homes, and for daylight in kitchens; preferred types of shading device; evaluating automatic lighting controls in communal areas; needs of partially sighted people for visual privacy; and work to include material on sight loss in daylighting guides.

Author

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How to obtain further information

A report entitled ‘Review of daylighting and windows in homes and applicability to homes of people with sight loss’ by Dr Paul Littlefair of BRE is available from:

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Horticultural Place
London W4 4JQ

Telephone: 020 8995 0880
Email: info@pocklington-trust.org.uk
Web: www.pocklington-trust.org.uk

Copies of this report in large print, audio tape or CD, Braille and electronic format are available from Thomas Pocklington Trust.
Background on Pocklington

Thomas Pocklington Trust is a leading provider of housing, care and support services for people with sight loss in the UK. Each year we also fund a programme of social and public health research and development projects.

Pocklington’s operations offer a range of sheltered and supported housing, residential care, respite care, day services, resource centres and volunteer-based community support services.

We strive to improve continuously the quality standards in our operational centres to meet the changing needs and expectations of our current and future service users. We are proud to be an Investor in People and a Positive about Disability organisation.

Our research and development programme aims to identify practical ways to improve the lives of people with sight loss by improving social inclusion, independence and quality of life, and improving and developing service outcomes as well as focusing on public health issues.

In this publication, the terms ‘visually impaired people’, ‘blind and partially sighted people’ and ‘people with sight loss’ all refer to people who are blind or who have partial sight.