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# **Safety of Older People on Stairs Behavioural Factors**

**A report prepared for The Department of Trade and Industry.**

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## SUMMARY

Falling on steps and stairs in the home is a serious problem for older people aged 65 and over, both in terms of the high frequency with which these accidents occur and their consequences. Although previous research has increased knowledge of personal and environmental factors involved in falls on stairs, behavioural aspects have received less attention. The aim of this investigation, therefore, was to improve understanding of how older people keep and use their stairs, and to assess the implications for stair safety.

Interviews were conducted with 157 older people, aged between 65-96 years, in their own homes. Using a combination of open and closed questions, participants were asked about their behaviour on and around the stairs, awareness of safety factors and any history of falling on stairs. During each visit, information was collected about the stairs in the home including design and repair of stair coverings, number of handrails and their condition, objects on and around the stairs, lighting, and position of windows. Standard anthropometric dimensions of interviewees were recorded, along with other measurements including grip strength, ability to get up from a stool without using hands, and measures of visual acuity and depth perception.

The results have been considered under three headings (1) behaviour involved in direct use of stairs, (2) decisions and actions that change the stair environment and (3) behaviour affecting individual capability. On direct use of stairs, two thirds of participants (63%) reported hurrying on occasions. Although 92% of interviewees recognised that carrying items up and down stairs could be hazardous, almost a third (29%) said they would attempt to carry something that might cause them difficulty. Cleaning the stairs appears to present particular problems, due to difficulties with access or the need to use heavy equipment, such as a vacuum cleaner. Among the 61% of households where low day time illuminance readings were found, 23% of participants reported not switching on stair lights during the day.

Behaviour affecting the stair environment includes leaving objects on stairs, generating either a slip or trip hazard or an object to fall into. While two thirds of participants (64%) recognised this as a problem, in almost one third of households visited (29%) objects were found on the stairs. Although most participants (86%) reported their stair covering to be in reasonable condition, in almost a third of cases (29%) the stair covering was judged by the researcher to be in need of replacement or repair. Additional handrails can increase confidence and around one third of homes (34%) had at some time had a second handrail fitted.

Use of medication and alcohol are examples of behaviour which can affect individual capability. Among study participants, 82% were taking at least one prescribed medication daily, with 16% reporting that their medication makes them feel drowsy, dizzy or affects their vision. Over one third of participants (38%) reported drinking alcohol when taking prescribed medications. Almost all of the sample (99%) reported using spectacles, although these are not always worn when using the stairs. Some 16% of participants indicated that

their spectacles cause them visual problems on stairs. Only 13% of the sample recalled having ever received advice about stair safety.

The findings show widespread prevalence of behaviour-based risk factors for older people falling on stairs. Often several risk factors coincide for a particular individual. While many participants were able to recognise hazards once prompted, many had not given much thought to stair safety prior to this. Some scope for prevention exists through improvement to the design of the stair environment or equipment installed or used around stairs which is generally addressed through building regulations and housing fitness standards. Also evaluated intervention strategies such as increased exercise and dietary adjustments will play a part in reducing all kinds of falls, including those on stairs. Beyond this, efforts to reduce falls need to raise awareness of risks and provide simple practical guidance and support to help older people deal with these. The DTI's campaign to prevent falls in older people is a welcome initiative in addressing this need.

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## DEFINITIONS

The following definitions apply in this report

### **fall**

an event which results in a person coming to rest inadvertently on the ground or other lower level (including slips and trips)

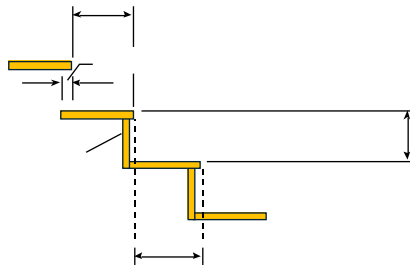
### **older person**

individual aged 65 years or over

### **flight of stairs**

3 or more steps indoors or outside

### **going, riser, nosing**



### **step**

one riser and one going

### **pitch**

acute angle of the slope between two nosings measured from the horizontal

### **home**

Any dwelling together with its garden, yard, driveway, paths steps and boundaries, where a person lives independently (including sheltered accommodation)

**HASS**

Home accident surveillance system, a database which contains details of a representative sample of cases across the UK where victims have visited a hospital accident & emergency department as the result of an accident in the home

**MMBI functional ability score**

Modified 'Modified Barthel Index' (Shah et al, 1989). Yields a score between zero and eight indicating an individual's self-assessed ability to carry out tasks of daily living. The lower the score, the more an individual considers they are able to do.

## 1 INTRODUCTION

Awareness of the scale of the problem of older people falling on steps and stairs in the home has grown over recent years. In the UK, HASS data indicate that 57,000 older people attend hospital A&E departments each year due to accidents of this nature, with almost 1,000 deaths occurring as a consequence. A further 22,000 individuals experience serious injury, suffering a fracture, concussion or otherwise requiring admission to hospital for more than a day (DTI, 2000; Metra Martech, 2000).

Stairs are the location in the home where most deaths and major injuries occur, with the most serious injuries being sustained when individuals fall whilst descending the stairs (Templer, 1992). When older people do have the misfortune to fall on stairs, the consequences are often traumatic and seriously disabling. Fracture injuries are more common among 'fallers' in this age group, and these and other injuries often take longer to heal than in younger persons (Pauls, 1985; Nagata, 1993; Dowswell et al, 1999). In addition to any physical injury, falls can also have serious psychological and social consequences, affecting confidence, mobility and general well-being. Unfortunately, the scale of the problem is set to increase as people continue to live for longer, with predictions based on past trends indicating an increase of 38% in non-fatal falls requiring hospital attendance among those aged 75 and over, for the period up to 2010 (DTI, 1999).

### 1.1 Factors involved in falls

Personal factors predisposing to fall accidents among older people include decreased balance ability, disturbed gait, cognitive impairment, reduced strength, impaired vision, illness, and side effects from use of medication (Askham et al, 1990; Bath & Morgan, 1999). While there is good understanding of how most of these variables are involved in the occurrence of falls, questions remain concerning the role of vision. Besides being important for monitoring the walking surface and detecting obstacles, vision also contributes to balance. Both depth perception and judgement of distance have been implicated as involved in fall accidents (Davis, 1983; Cohn and Lasley, 1985), and distraction in the visual field has been suggested as a factor in falls on stairs (Templer, 1992). It has also been shown that patterns on floors and walls, which create a visual depth ambiguity, termed the Helmholtz 'wall-paper illusion', may contribute to falls on escalators and other carpeted walkways with a repeating visual appearance (Cohn and Lasley, 1985; 1990). The extent to which these issues might be involved in older people falling on steps and stairs in their home is uncertain.

It has been suggested that aspects of the environment are a significant issue in all fall accidents in older people in up to a half of cases (HEA, 1999). Dowswell et al (1999) suggested that falls among the 'young elderly' (65-74) are more likely to involve environmental factors, while personal factors are more important in the 'oldest' age group (those aged 85 and over). Environmental problems connected with stairs may include

poorly designed or absent handrails, stairs that are too steep, step surface or covering in poor condition, objects left on steps, and poor lighting (Templer, 1992). Often, houses in which older people live were designed for fit, active persons, and do not cater well for changing needs and abilities as people age (Healy and Yarrow, 1998).

Behaviour, especially when coupled with inadequacies of the surroundings or personal frailty, has also been mentioned as playing a large part in many falls on stairs (Templer, 1992). This may involve either the manner of stair use, or decisions taken which affect the stair environment. For example, it has been suggested that older people may be less able to maintain their stairs in good repair (Healy and Yarrow, 1998). Others have identified that older people should be encouraged to notice possible dangers in their home that may contribute to their falling (Ashton, 1998).

Although behaviour has been raised as an issue, there has been surprisingly little research examining how older people keep and use their stairs and the implications for safety (Askham et al, 1990). Moreover, effective targeting of accident prevention efforts requires understanding of older peoples' knowledge of factors affecting their safety on stairs, and what influences their behaviour. It would also be of benefit to know more about the coping strategies individuals develop to compensate for declining abilities, and how these might be supported through design and other interventions (Smith, 1990).

## **1.2 Aims and objectives**

The aim of this research was to improve understanding of behavioural factors affecting the safety of older stair users. Specific objectives were to:

1. document the habits of older people in relation to stair use
2. determine factors affecting the safety of older stair users
3. examine the effects of personal characteristics such as fall history, muscular strength, and visual abilities on other aspects of stair use
4. identify other influences on stair use behaviour
5. provide information to inform guidance on stair safety

The study focussed on older people, aged 65 and over, living in their own homes. The main element of the research involved 150 home-based interviews.

## 2 PRELIMINARY FOCUS GROUPS

A series of 3 focus groups were held to collect initial information on how older people use their stairs, why they use them the way they do, and to identify circumstances perceived as affecting risk of falling. A summary of findings from the focus groups is presented below. Full details of methods and results may be found in Appendix A.

### 2.1 Participants

A total of 24 individuals, 20 women and 4 men, formed three focus groups, each meeting on a separate occasion. Ages ranged from 65 to 79 years (mean= 70.6).

### 2.2 Summary of findings

The older people participating in the focus groups were generally able to recognise and appreciate many of the factors that increase the risk of falling on stairs. Most participants reported that they had not given much thought to stair safety prior to the focus groups. The issues that emerged were:

- older people use their stairs as and when necessary, but tend to increasingly avoid stair use as it becomes more difficult
- the location of essential facilities in some homes necessitates use of stairs (e.g. toilet)
- safety implications of features of the environment appear to be more readily identified than risks arising from behaviour
- behaviour that increases risk of falling on stairs is commonplace, such as hurrying, leaving objects on stairs, or using the stairs at night without use of lighting
- cleaning stairs can present problems for some people due to difficulties with access, or the need to use heavy and awkward equipment
- older people may continue with some activities, such as carrying laundry up and down stairs or vacuuming, despite finding them difficult and despite having concerns about safety
- older people generally recognised that medications and the use of alcohol may increase risk of falling, but individuals may not fully appreciate when they personally are at increased risk
- the use of bifocal and varifocal spectacles may affect vision and balance on stairs

## 3 HOME INTERVIEWS - METHODS

Following the focus groups, interviews were conducted with 157 older people living in their own homes, to collect detailed information on stair use and factors influencing this. A summary of the method is presented in the following sections, full details are provided in Appendices B-C. Two researchers conducted the interviews, undertaking 112 and 45 interviews respectively.

### 3.1 Recruitment and sampling

Participants were recruited on a convenience basis from the counties of Nottinghamshire and Leicestershire, using a combination of direct and indirect contact. Potential participants were approached directly using subject lists already held at Loughborough University. Individuals were telephoned and given brief details about the study. Indirect contact was made using a 'recruitment' letter (Appendix B), distributed via organisations including Age Concern, British Red Cross Society, University of the Third Age, and forums for older people, e.g. bowls clubs, social service departments and day centres. People interested in participating in the study were asked to return a reply slip (Appendix B). Individuals were then contacted to arrange a convenient time for an interview to take place.

Sampling was on a quota basis, according to age and gender, using estimated population figures for the UK (ONS, 1991). Likewise, houses were selected based on national estimates of housing stock with respect to age and type of dwelling (Survey of English Housing, 1998). Socio-economic class was assessed using postcode analysis provided by Experian Ltd. This used micromarketing groups, which were subsequently categorised into six socio-economic groups (A\B\C1\C2\D\E).

### 3.2 Interview content and protocol

#### 3.2.1 Information and consent

At the beginning of each interview participants received an explanation of the purpose of the study and what the interview would entail, and were asked to provide written informed consent (Appendix B). Each interview lasted approximately 2 hours. Ethical approval for the study was sought and obtained from Loughborough University Ethical Committee.

#### 3.2.2 Interview schedule

The interviews followed the format given in table 3.1. (Full details of methods and questionnaires are provided in appendix C.)

### 3.3 Statistical analysis

Statistical analysis used Chi<sup>2</sup> test for cross-tabulation calculations and Pearson and Spearman correlation coefficient as appropriate.



Table 3.1

## Interview schedules

Questionnaire	Content	Basis for inclusion	Developed by
Chances of falling on the stairs self-completion questionnaire	<ul style="list-style-type: none"> <li>participants' knowledge of factors affecting stair safety</li> </ul>	assessment of relationship between knowledge and behaviour	Loughborough University
Your stairs self-completion questionnaire	<ul style="list-style-type: none"> <li>participants' opinions on the design, condition and safe use of their stairs</li> </ul>	individuals' ability to assess condition comparison of results with findings from similar BRE survey	Buildings Research Establishment
Stair environment survey undertaken by interviewer	<ul style="list-style-type: none"> <li>design and condition of stairs</li> <li>design, colour and state of stair coverings</li> <li>colour and design of wall coverings</li> <li>number of handrails and their condition</li> <li>objects/items on and around stairs</li> <li>lighting provision during the day and night</li> <li>position of windows</li> </ul>	objective assessment of stair environment; comparison with participants' own assessment	Loughborough University
Participant information structured interview	<ul style="list-style-type: none"> <li>gender</li> <li>date of birth</li> <li>conditions affecting vision</li> <li>general medical conditions</li> <li>prescribed and non-prescribed medications</li> </ul>	basic information	Loughborough University
Ability to carry out daily activities structured interview	<ul style="list-style-type: none"> <li>participants' ability to carry out a range of daily activities</li> </ul>	measure of self-assessed functional ability	Modified from Barthel Index
Stairs in the home semi-structured interview	<ul style="list-style-type: none"> <li>patterns of use of stairs, handrails and lighting</li> <li>behaviours associated with stair use, e.g. carrying, hurrying, cleaning</li> <li>placing objects on stairs</li> <li>other issues regarding stair use including: footwear, alcohol consumption, behaviour of pets and receipt of previous stair safety advice</li> </ul>	information on behaviour	Loughborough University
Falls on the stairs semi-structured interview	<ul style="list-style-type: none"> <li>history of falls since age 65.</li> </ul>	examination of differences in behaviour and attitudes between 'fallers' and 'non-fallers'	Loughborough University
Physical and physiological measurements	<ul style="list-style-type: none"> <li>height, weight, length of feet</li> <li>functional ability ('grip strength', 'rise from stool')</li> <li>vision (acuity, stereopsis)</li> </ul>	basic information on participants and their functional ability	Loughborough University

## 4 HOME INTERVIEWS - RESULTS

A total of 157 participants were interviewed for the survey. The majority of these took place on an individual basis, but 14 married couples were interviewed with both partners present. Consequently 150 households were visited in total. For the evaluation of the effects of age, the participants were split into three age groups. These were 'youngest' (65-74), 'middle' (75-84) and 'oldest' (85 and over). Full descriptive results are available from the authors on request.

### 4.1 Participant characteristics

Details of participants including personal details, living circumstances, BMI, anthropometric measures, functional ability and visual abilities are presented in tables 4.1–4.8.

#### 4.1.1 Personal characteristics

**Table 4.1** Participant characteristics

	Population figures for UK (%)	participants in study (%)
male	41	28
female	59	72
age group 65-74	54	47
age group 75-84	35	41
age group 85+	11	12
Social class		
groups A and B	-	40
groups C1 & C2	-	28
groups D & E	-	32
Age summary	mean 77 years standard deviation 7.1	range 65-96

#### 4.1.2 Living circumstances

**Table 4.2** Living circumstances

living alone	58%
living with others	42%

The 'oldest' participants were more likely than those in the younger age groups to live alone ( $p < 0.001$ ). Of those in the 'oldest' age group, 84% lived alone, with women more likely than men to be single occupants.

### 4.1.3 BMI and anthropometric measures

**Table 4.3** Body mass index (weight [kg]/height [m<sup>2</sup>])

	All participants (%)	Men (%)	Women (%)
low (16-20)	8	5	10
normal (21-25)	35	43	32
high (26-30)	36	32	37
obese (31 +)	21	20	21
<b>BMI (all participants)</b>	<b>mean 26</b>	<b>standard deviation 5.2</b>	<b>range 17–45</b>

**Table 4.4** Length of largest foot

	Male (mm)	Female (mm)
mean	267	243
standard deviation	11	12
minimum	244	218
maximum	286	274

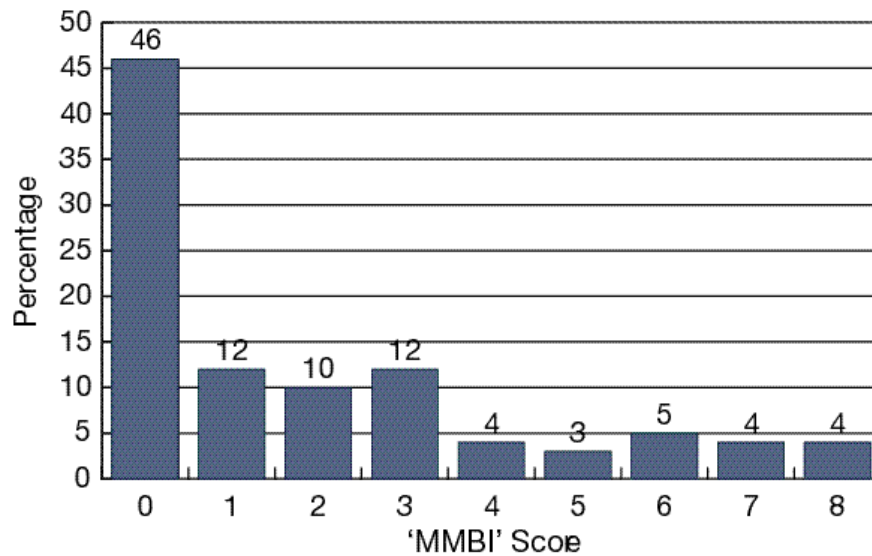
### 4.1.4 Functional ability tests

Functional ability was assessed using three methods:

- i) MMBI self-rating of ability to carry out daily activities
- ii) 'rise from stool' test
- iii) 'grip strength' test

Results for MMBI functional ability scores are presented in figure 4.1. As might be expected, the 'youngest' and 'middle' age groups had a higher proportion of respondents with low (greater ability) MMBI scores ( $p < 0.01$ ). There was no difference in MMBI score with gender. Participants who reported using a walking aid were more likely to have higher MMBI scores ( $p < 0.001$ ).

**Figure 4.1** MMBI functional ability scores (0=high level of ability)



**Table 4.5** 'Rise from stool' test - subjective assessment

	Participants' assessment (%)	Researchers' assessment (%)
able to do without difficulty	24	45
able to do, but with some difficulty	21	16
able to do, but with a lot of difficulty	6	2
unable to do	18	not asked
don't know	31	not asked
attempted but unable	not asked	21
did not attempt	not asked	16

The 'oldest' participants experienced more difficulty with the 'rise from stool' test ( $p < 0.001$ ), with a higher proportion of those from this age group attempting to get up from the stool unable to do so.

**Table 4.6** 'Grip strength' for preferred hand (average of 4 readings, N=Newtons)

	Male (N)	Female (N)
mean	304	186
standard deviation	59	49
minimum	186	88
maximum	471	304

The grip strength of participants in this study were slightly lower than those from the Allied Dunbar (1992) National Fitness Study. Allied Dunbar reported mean values of 360N for men and 220N for women aged 65-74. Associations between the three functional ability tests are presented in table 4.7.

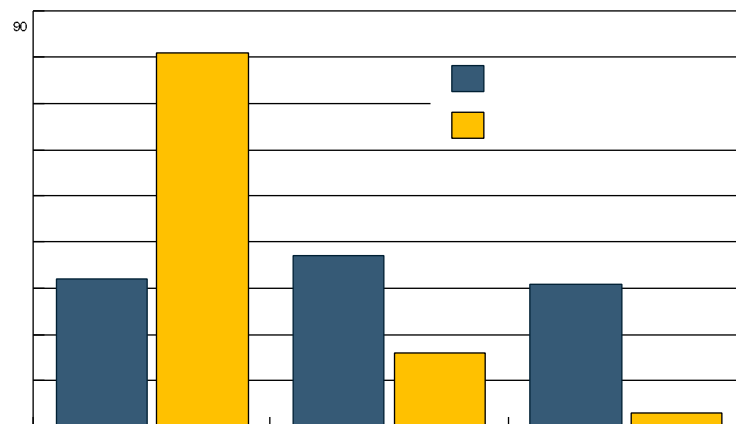
**Table 4.7** Functional ability associations

	Effect	Significance
MMBI with 'rise from stool'	positive correlation	p<0.001
MMBI with 'grip strength'	no association	ns
'grip strength' with 'rise from stool'	no association	ns

### 4.1.5 Binocular visual acuity

Visual acuity was tested at a distance of 2.5 metres, with scores converted to conventional notation. A high proportion of participants (68%) had uncorrected visual acuity worse than 6/12, with 19% of participants having corrected visual acuity worse than 6/12, figure 4.2.

**Figure 4.2** Binocular visual acuity



There appeared to be little difference between the age groups for uncorrected visual abilities, with the majority of the participants having visual acuity worse than 6/12. With corrected visual acuity, the 'youngest' and 'middle' age groups had improved acuity with most reaching 6/12 or better ( $p < 0.001$ ), but for the 'oldest' age group, wearing glasses did not improve visual acuity for the majority. In the UK, the visual acuity requirement for driving is approximately 6/15 or better. The majority of participants (60%) did not achieve this level uncorrected, but once corrected with their spectacles, only 12% had acuity less than this. There were no differences between interviewees with and without experience of a fall with respect to their visual acuity. It is not clear from the data whether any relationship existed between visual acuity and whether interviewees considered themselves to be at risk of falling.

**Table 4.8** Spectacle use and stereopsis

wears bifocal spectacles	57%
spectacle wearers who reported not wearing glasses when they get up during the night	27%
unable to detect depth to pattern – uncorrected vision	50%
unable to detect depth to pattern – corrected vision	25%

A number of participants (16%) reported that their spectacles cause them visual problems when using the stairs. These problems included an inability to judge depth (and consequent uncertainty in the location of steps) and distortion of the steps when using bifocal spectacles. However many bifocal wearers (80%) reported that they did not experience any of these problems.

## 4.2 Housing characteristics

Details of house characteristics, general stair design, handrails and landing windows are given in tables 4.9–4.11.

### 4.2.1 House Characteristics

**Table 4.9** Housing characteristics (n=150)

	House types in UK (%)	House types in sample (%)
detached	21	37
semi-detached	32	27
terraced	28	20
purpose-built flat	13	13
other types of houses	6	3
households with only a single toilet, upstairs	-	33%
households with only a single toilet, downstairs	-	8%
households with toilets upstairs and down	-	59%
<b>Age of house</b>	<b>median 41 yrs</b>	<b>range 6–400 yrs</b>

### 4.2.2 General stair design

A total of 188 flights of stairs were surveyed across the 150 households visited.

**Table 4.10** Stair flights surveyed

flights used most frequently, usually positioned between two main floors	79%
other stairs within dwelling, usually leading to attic or cellar	11%
outside flights of three steps or more	10%
stairs of closed riser design	97%
households with stair pitch more than 42°	65%

A pitch of 42° is the maximum steepness permitted for private stairs by the Building Regulations. All the houses built within the last 30 years had a stair pitch less than 42° with the older houses tending to have stairs steeper than 42° ( $p < 0.001$ ).

### 4.2.3 Handrails

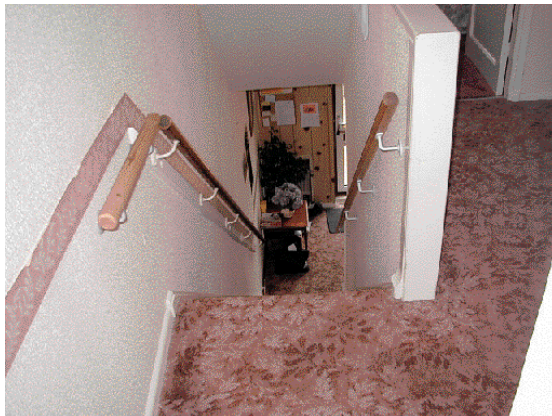
**Table 4.11** Handrails

households with one handrail	59%
households with 2 handrails	34%
flights where handrail in need of repair	10%
of those households with 2 handrails, 2nd rail fitted by the householder	70%

Of those participants whose house had one handrail, 24% said that they had considered having a second fitted. Of those who had not considered it, when asked 17% thought that they would eventually need one. Fewer participants with a low MMBI functional ability score had two handrails fitted to the stairs ( $p < 0.05$ ).

A variety of configurations of additionally fitted handrails were found, as illustrated in figures 4.3 and 4.4.

**Figure 4.3** Extended handrail at top of stairs (household 099)



**Figure 4.4** Grab rails on stairs (household 133)



### 4.2.4 Landing Windows

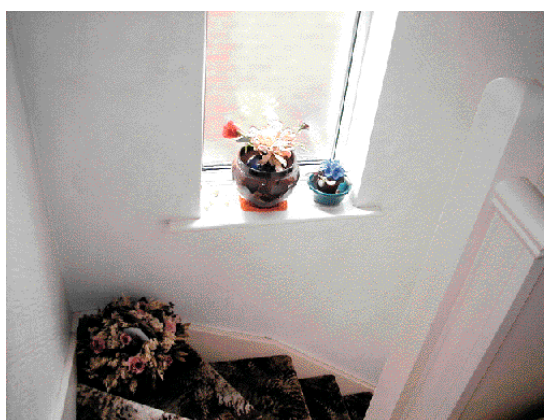
Landing windows were found positioned over the upper landing, part way over the landing and also over the stairs, for example figures 4.5 and 4.6. In 41% of households, windows were positioned part way over the landing or completely over the stairs. Where windows were in these positions, a number of participants reported difficulty accessing the window to clean it (27%), open it (20%) or to change curtains (26%). These figures include difficulty due to both the position of the window and to the functional ability of the

individual. The older the age group the more likely it was that participants had problems cleaning the landing window ( $p < 0.01$ ), opening the window ( $p < 0.05$ ) and changing the curtains at the window ( $p < 0.001$ ). However, no statistical association was found between MMBI functional ability score and the occurrence of these problems. Unsurprisingly, a small positive association was found between problems gaining access to a landing window and ability to perform the ‘rise from a stool’ test ( $p < 0.05$ ).

**Figure 4.5** Landing window located above stairs (household 055)



**Figure 4.6** Landing window located above winder (household 019)



### 4.3 Behaviour involved in direct use of stairs

Summary results for patterns of use, hurrying, carrying objects, cleaning, and use of lighting are presented in tables 4.12–4.16.

#### 4.3.1 Patterns of use

**Table 4.12** Patterns of use (multiple responses)

mostly in the morning	38%
mostly in the afternoon	11%
no particular time of the day	57%
avoid using the stairs wherever possible	32%

Participants with a MMBI functional ability score between 4 and 8 tended to use the stairs less frequently ( $p < 0.001$ ). The ‘youngest’ and the ‘middle’ age groups reported using the stairs more frequently than the ‘oldest’ age group ( $p < 0.01$ ). There were no differences in frequency of stair use for ‘fallers’ and ‘non-fallers’ or those living with others or those living alone.



### 4.3.2 Hurrying

When asked, 89% of interviewees identified hurrying on the stairs as a factor that would increase the risk of falling. However, 63% stated that they do hurry on occasions, giving various reasons for this.

**Table 4.13** Reasons given for hurrying on stairs (multiple responses)

respond to someone at the door	38%
answer the telephone	27%
retrieve items left upstairs	23%
use an upstairs toilet	13%

A sizeable proportion of participants (37%) said they made a point of not hurrying for any reason. The older the participant the less likely they are to hurry ( $p < 0.001$ ). Those participants with higher MMBI functional ability scores or less able to perform the 'rise from a stool' test, tended to report avoiding hurrying on the stairs ( $p < 0.001$  in both cases).

### 4.3.3 Carrying objects

A large proportion of participants (92%) recognised that carrying objects either up or down stairs could be hazardous. A small number of participants (5%,  $n = 8$ ), the majority of whom ( $n = 6$ ) were aged 75 and over, explicitly pointed out that they no longer attempt to carry anything up or down stairs. Many participants mentioned strategies they employ to improve their safety when carrying objects up and down stairs, examples of which are given in table 4.14. An example of a method developed by one participant can be seen in figure 4.7.

**Table 4.14** Strategies used when carrying objects

lean forward when going upstairs and lean backwards going downstairs, to maintain balance
go more slowly
rest items on steps and move up with them
come down backwards, moving the item down a few steps at a time
throw items down
use a bag to put items in
carry item in one hand, leaving the other hand free to use the handrail

*Percentages not given as information extracted from textual reports.*

**Figure 4.7** Participant has made a bag for carrying objects up and down stairs



A number of participants (17%) mentioned that they need to see the steps to feel safe when carrying objects down the stairs. To make this possible, the object is generally held to one side. Some 29% of participants reported that when needing to move an object up or down the stairs that may cause them a problem, they would not ask for help but ‘have a go anyway’.

#### 4.3.4 Cleaning

**Table 4.15** Methods used to clean stairs

use standard vacuum cleaner	36%
employ cleaner, or rely on a carer or relative	34%
use small hand held vacuum	17%
use brush and pan	11%
use a damp cloth	2%

Participants in the ‘youngest’ age group and those with low MMBI functional ability scores tended to use a ‘normal’ vacuum cleaner when cleaning the stairs. Proportionally more of the ‘oldest’ age group choose to use a small hand held vacuum cleaner, or do not clean the stairs themselves ( $p < 0.001$ ). Of those who do clean their stairs, a majority (55%) reported doing so in the direction of top to bottom, moving down backwards. Some 35% of the group who do their own cleaning identified various aspects of vacuum cleaner use as problems they thought would increase risk of falling.

### 4.3.5 Use of lighting

**Table 4.16** Participants reported use of lighting

do not use stair lights during the day	68%
generally use lights to a minimum	30%
do not switch the stair lights on when going downstairs during the night	18%

Cost was mentioned specifically by 11% of participants as a reason that they use lights to a minimum.

### 4.3.6 Use of handrails

When asked about the frequency of use of handrails, 72% reported that they use handrails every time they use the stairs. In households with two handrails fitted, 74% of participants stated that they use both of these.

## 4.4 Behaviour affecting stair environment

Details for leaving objects on the stairs and stair coverings are presented in tables 4.17–4.19.

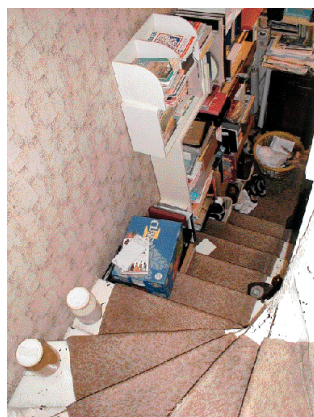
### 4.4.1 Leaving objects on stairs

**Table 4.17** Leaving objects on stairs

households with objects placed on stairs	29%
objects small and apparently temporary	10%
objects apparently permanent (e.g. furniture)	19%

Permanent objects were more likely to be positioned on stairs in detached houses, and temporary objects were seen more often on stairs in terraced houses ( $p < 0.001$ ). Examples of items seen on stairs are shown in figures 4.8 and 4.9.

**Figure 4.8** Temporary and permanent objects on stairs (household 095)



**Figure 4.9** Permanent object placed on half landing (household 076)



**Table 4.18** Factors associated with leaving objects on stairs

	Effect	Significance
gender	none	ns
living alone	none	ns
age	negative	p<0.01
MMBI functional ability scores	negative	p<0.01
'rise from stool' test	negative	p<0.001
'fallers'	none	ns

When asked, 89% of participants identified leaving objects on stairs as a factor that would increase the risk of falling. However, a large number of participants (71%) reported that they do place objects on stairs. There was considerable overlap between those identifying this as a risk factor and those engaging in the practice ( $p < 0.01$ ).

#### 4.4.2 Stair coverings

**Table 4.19** Stair coverings

flights with carpet covering	79%
flights with non-patterned coverings	43%
households with worn, frayed, or poorly fitted coverings	29%
households with loose rugs or mats positioned at top of stairs	11%

When asked whether their stair covering was in need of repair, only 8% reported that it was. However, on inspection by the interviewer, 29% of the coverings were found to be either worn, frayed or poorly fitted.

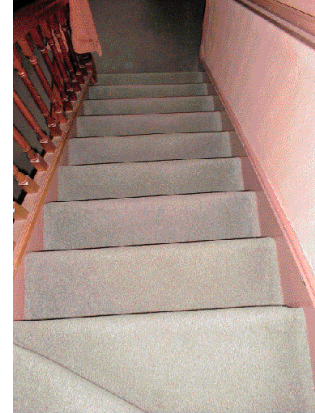
No differences were found with the social class of the participants or with the tenure of the house in the proportions of households with worn, frayed or poorly fitted stair coverings. Nor were there any differences between participants of different social class, or with different visual acuity, in the presence of loose mats or rugs at the top of the stairs. However, it must be noted that the sample size for this analysis was small. It is also noteworthy that no one in the 'oldest' age group had a rug or loose mat positioned at the top of the stairs. Coverings in households where the stairs are steep (i.e. the riser high and the going short) tended to show more signs of wear, although this difference was not statistically significant.

In some instances heavily patterned carpets were found which make it difficult to distinguish step edges, e.g. compare figures 4.10 and 4.11.

**Figure 4.10** View looking down stairs (household 097)



**Figure 4.11** View looking down stairs (household 114)



### 4.4.3 Environmental lighting

Table 4.20 gives details of lighting found in the survey households.

**Table 4.20** Environmental lighting

households where artificial light was required during the day (50 lux or less)	61%
households with bulbs 60 watts or less at top of stairs	44%
households where low energy bulbs in use at top of stairs	24%
ambient illumination level at night, with lights switched off	mean 0.04 lux

There was no association between wattage of bulb used at the top of the stairs with tenure of the house, visual acuity or having fallen previously. Of those living in dwellings where illumination levels were recorded as being below 50 lux, 28% reported that they generally do not use their stair lights during the day.

### 4.4.4 Other environmental issues

In a small number of households (3%, n= 5) mirrors were found positioned on half-landings or close to the top of stairs, e.g. figure 4.12. In some other homes (6%, n= 9) stairlifts had been fitted along the length of the flight reducing the width. For example, figure 4.13.

**Figure 4.12** Mirror positioned on half landing (household 009)



**Figure 4.13** Stair lift fitted to stairs (household 026)



#### 4.4.5 Changes to the stair environment

A number of households had made changes to the stair environment over the previous 5 years, table 4.21.

**Table 4.21** Households having made changes to the stair environment during previous 5 years

2nd handrail or grab rails fitted	17%
new stair carpet fitted	16%
brighter bulbs fitted at top of stairs	4%
clearer lampshades fitted	3%
low energy light bulbs fitted at top of stairs	5%
stair walls painted a brighter colour	5%
other changes	9%

#### 4.5 Behaviour affecting individual capability

Details for prescribed medications, alcohol and prescribed medications are presented in tables 4.22–4.23.

##### 4.5.1 Prescribed medications

**Table 4.22** Prescribed medications

at least one prescribed medication taken daily	82%
4 or more prescribed medications taken daily	26%
participants reporting that their medicines make them feel drowsy, dizzy or affect their vision	16%

In the sample 58% of the ‘middle’ age group take 4 or more prescribed medications daily, compared with the ‘youngest’ (25%) and oldest’ (17%) groups ( $p < 0.01$ ).

#### 4.5.2 Alcohol and prescribed medications

**Table 4.23** Alcohol and medications

Participants reporting not avoiding alcohol when taking prescribed medications.	38%
Main reasons given by participants for not avoiding alcohol when taking prescribed medications were:	
not warned by GP not to drink alcohol with medication	31%
GP had said they could continue to drink alcohol whilst taking medications	2%
considered they do not drink enough to affect their medications	8%
considered that alcohol does not affect the medications they are taking	7%

A relationship was found between gender and the reporting of alcohol drunk in the previous 7 days before the interview, with 77% of men as opposed to 57% of women reporting having done so ( $p < 0.05$ ). In addition, 70% of men but only 47% of women reported not avoiding alcohol whilst taking prescribed medications ( $p < 0.05$ ).

#### 4.5.3 Exercise from using stairs

Although not prompted during the interview, a number of participants (10%) specifically mentioned using the stairs as a form of daily exercise.

#### 4.6 Previous experience of falling

Of the participants, 43% reported having experienced a fall on the stairs, some of whom had had repeated falls. Details are given in table 4.24.

**Table 4.24** Participants’ history of falling on stairs

fallen at least once	30%
fallen at least twice	8%
fallen three times or more	10%
descending the stairs when fall occurred	66%
carrying at the time of the fall	26%
hurrying at the time of the fall	10%

Within the sample, ‘non-fallers’ tended to live in detached dwellings, with ‘fallers’ living in semi-detached houses ( $p < 0.05$ ). Almost half (46%) of the ‘fallers’ were either unable to complete, or did not attempt, the ‘rise from stool’ test, although no statistical relationship was found between ‘fallers’ and ‘non-fallers’ for this test.



Details of variables associated with participants who had fallen previously are presented in table 4.25.

**Table 4.25** Variables associated with experience of falling

	Effect	Significance
age	none	ns
BMI	none	ns
4 or more prescribed medications taken daily	positive association	p<0.05
MMBI functional ability score	none	ns
'rise from stool'	none	ns
problems holding onto handrail (might be due either to design of rail or personal factors)	positive association	p<0.05
pitch of stairs (steepness)	none	ns
consider stairs to be safe	none	ns
visual acuity	none	ns
use of a walking aid	none	ns
Behaviours: hurrying, leaving objects on stairs, carrying, methods used to clean the stairs, use of lighting and handrails, alcohol consumption	none	ns

Most 'fallers' (87%) rated their stairs to be safe. The majority of 'fallers' (72%) had uncorrected visual acuity of less than 6/12. In 24% of falls experienced by participants, footwear was mentioned as an issue.

The consequence of the falls reported by the participants are detailed in table 4.26.

**Table 4.26** Consequence of reported falls

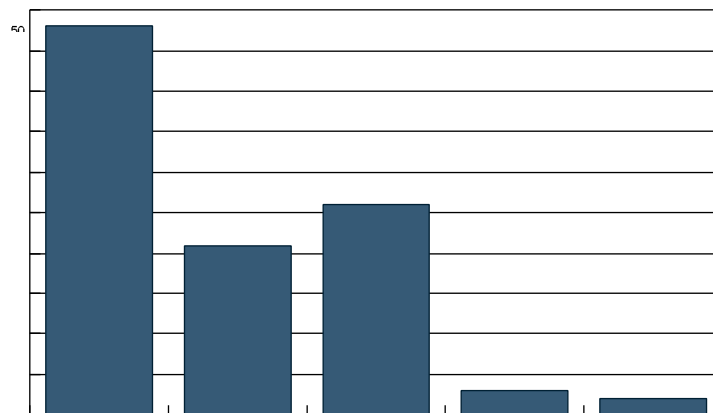
attendance at A & E	20%
presentation to GP	13%
no medical attention sought	67%
'fallers' who reported being more careful or more aware when using stairs since falling	77%

A number of participants (28%) said they were concerned about falling on the stairs. Of these, approximately half of those who expressed fears were people who had experienced a fall on the stairs. When asked if they considered their stairs safe to use, 90% of participants rated them as so. The majority of participants felt that their stairs were safe to use regardless of their MMBI functional ability score or their ability to perform the 'rise from stool' test.



Participants were asked to use a percentage scale to rate their risks of falling and these results are presented in figure 4.14.

**Figure 4.14** Perceived risk of falling on the stairs



More 'non-fallers' (65%) than 'fallers' (35%) rated themselves as having less than 25% risk of falling on the stairs.

#### 4.7 Combinations of risk factors

Several of the frequently occurring risk factors found in the survey were examined for the frequency with which these coincide for individual participants, table 4.27. Factors looked at were: hurrying on the stairs, placing objects on the stairs, not asking for help carrying an object that may cause a problem up/down the stairs, not switching the light on when getting up during the night, and combining prescribed medications and alcohol.

**Table 4.27** Participants with behavioural risk factors coinciding

2 risk factors	29%
3 risk factors	28%
4 risk factors	15%
5 risk factors	1%

#### 4.8 Advice about stair safety

Table 4.28 presents details of advice received by participants on stair safety and its origin. No relationship was found between individuals that had received advice and experience of falling, MMBI functional ability scores, or age.

**Table 4.28** Participants having received advice on stair safety

received advice about stair safety	13%
from occupational therapist	7%
via leaflets, television or other means	6%
found the advice useful	7%

## 5 DISCUSSION

As with other types of accidents, falls on stairs usually happen as the result of a combination of factors, none of which in isolation would be likely to result in an incident. For example:

"I was carrying the washing basket downstairs and feeling unwell.  
I had a lot on my mind and slipped and fell all the way down to the bottom."

"I was suffering with jet-lag from holiday,  
I was carrying a tray with cups on and missed the bottom step."

"I got into bed, I'd had a drink and realised that I hadn't got any meat out for Sunday, rushed downstairs and slipped. The shopping trolley was at the bottom, I wouldn't have hurt myself if it wasn't for the trolley ...I was off about a fortnight, I cracked my ribs.

But that was my own fault, I had had a drink, and I had nothing on me feet."

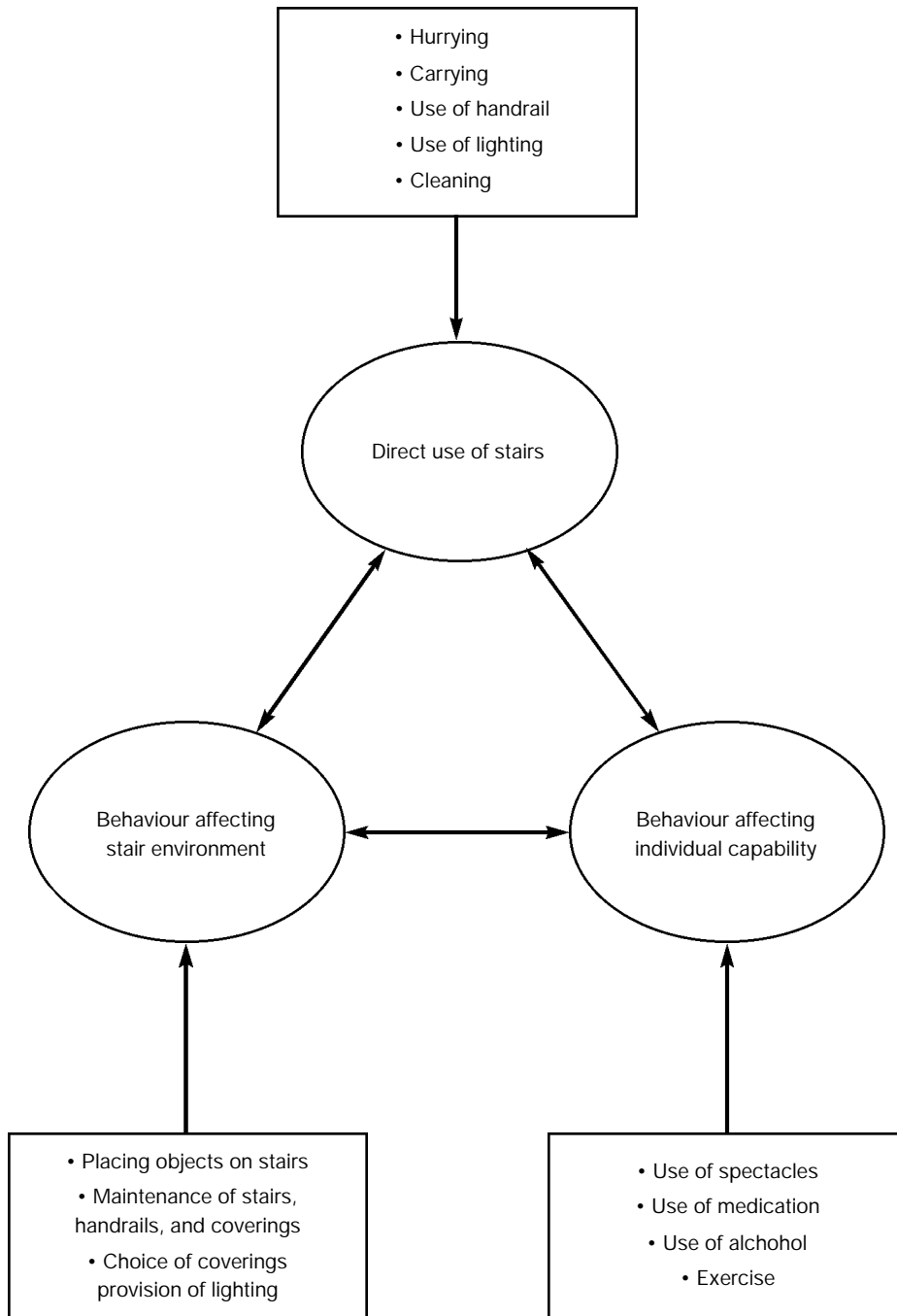
The more risk factors present, the greater the chances of a fall and subsequent injury occurring. Efforts to improve safety should be directed at eliminating or reducing risk from those factors that can be modified.

Many of the risk factors for falls on stairs, such as the design of the stairs and personal factors predisposing to falling, have been identified by previous research (Templer, 1992). Behaviour, however, has received less attention. Three types of behaviour are identified here as affecting the risk of falling on the stairs:

- direct use of stairs
- decisions and actions that change the stair environment
- behaviour which affects an individual's capability

The proposed interplay of factors is described in figure 5.1.

Figure 5.1 Influence of behaviour on safety of older people on stairs



## 5.1 Behaviour involved in direct use of stairs

### 5.1.1 When do people use their stairs?

Half of all participants said that there is no particular time of day that they use their stairs more often. Over a third (38%) responded that the morning was the period of most frequent use, giving various reasons for this. Some individuals mentioned the effects of medications increasing the need for them to use the toilet in the mornings, this often being urgent, making it necessary to hurry (one third of the households had only a single toilet upstairs). Other reasons given for using stairs more in the morning were to perform housework tasks, to get ready to go out, or to retrieve forgotten items from upstairs.

As might be expected, individual functional ability affects the frequency of stair use, and those with decreased ability use the stairs less often. Of those who stated that they use the stairs infrequently, the majority pointed out that conditions that affect their legs, (e.g. pain in knees or hips), or other medical conditions that make it difficult to exert themselves (e.g. heart problems or breathlessness) was the reason for their stair avoidance.

### 5.1.2 Hurrying

Hurrying on stairs is a risk factor for falling, due to a combination of reduced attention and increased momentum making it more difficult to recover disturbances of gait. The majority of those interviewed (89%) identified hurrying as increasing risk of falling, yet this knowledge did not translate to their actual behaviour, with two thirds (63%) of participants reporting hurrying on occasions. The reasons given for hurrying appear to fall into two categories: personal reasons, such as the need to use a toilet upstairs, and situations prompted by external sources, e.g. the need to attend to someone at the door or answer the telephone. Often, the perceived need to respond quickly can be powerful. A further instance mentioned in the focus groups was the setting or cancelling of intruder alarms:

"We can isolate the upstairs fortunately, but if you forget to do that, you've not got a lot of time to race downstairs and switch it off. That can be hazardous."

With regard to the telephone, some participants reported using a ring back system, where the telephone number of the last caller can be recalled by dialling a number, such as '1471' in the case of BT, but noted that it generally still did not stop them from hurrying. Although many methods were presented by participants as means of reducing the need to hurry, the majority of those who mentioned these approaches still said that they continue to hurry on occasions. Those who did report avoiding hurrying tended to have reduced mobility, as measured by the MMBI index and 'rise from stool' test. Thus, it seems that personal ability becomes the limiting factor which modifies behaviour.

Within the falls that participants reported having experienced themselves, a small number were attributed to hurrying, for example:

"The phone rang and I hurried down to answer it,  
I slipped and fell to the bottom of the stairs."

"I fell from top to bottom hurrying,  
I had slippers on and did not place my foot correctly on the step."

"I missed the last step while rushing."

### **5.1.3 Carrying items**

Items being carried can restrict the view of the stair surface, affect balance and prevent use of handrails. Many interviewees recognised that carrying objects up and down stairs can increase the risk of falling. However, it is noteworthy that almost a third of participants (29%) in the study still said that they would attempt to carry an object that might cause them difficulty. A desire to maintain independence, or a lack of access to someone able to provide assistance, seems the most likely explanation for this.

Respondents identified a number of strategies adopted to make carrying items up or down stairs safer. Unfortunately, it is possible that some of these may generate alternative hazards. For example, a number of participants said that, when carrying something, they descend the stairs backwards, moving down one step at a time, placing the object being carried on the step in front of them, and moving it down gradually. A problem with this method is that it can pose the risk of misjudging the bottom of the stairs. Among the reports were descriptions of situations where the person had reached the second to bottom step, stepped back thinking they were at the bottom and fallen backwards:

" I was coming down stairs backwards cleaning and I thought I was at bottom of the stairs, but I wasn't and stepped down two steps instead of one. I fell backwards and banged my head and top of my body on the heater at the bottom of the stairs."

Carrying laundry down stairs was mentioned as a time when the risk of falling was increased. Many respondents said that they sometimes throw laundry down the stairs, but this method poses the risk of tripping on any items that may land on the steps. A possible solution to this may be to have a laundry basket next to the washing machine and dirty items can be brought down a few at a time, thereby eliminating the need to carry down large amounts of laundry at one time. A more radical alternative might be to locate washing machines and tumble dryers on the same level as bedrooms or bathrooms, although convention and habits are likely to be obstacles to such change.

A number of interviewees reported using a walking stick when in the house, with the need to carry it up or downstairs. A simple way of avoiding having to carry the stick between

floors is to have two sticks, one kept at the top and the other kept at the bottom of the stairs, leaving both hands free to use handrails.

#### **5.1.4 Cleaning**

Cleaning on and around the stairs appears to present particular problems, due to a combination of difficult access (e.g. landing windows) or the need to use awkward and heavy equipment (vacuum cleaners in particular). Some people seem to reach a point where reduced strength and flexibility lead them to seek alternative methods, such as using a small, hand-held, battery operated machine, or employing a relative or another person to clean the stairs on their behalf. However, it seems likely that many individuals will pass through a stage prior to this, where they struggle to clean as in the past, not accounting for their changing abilities, and placing themselves at increased risk of falling as a consequence. The challenge here is to encourage older people to respect their limitations, without encouraging negative attitudes.

#### **5.1.5 Use of lighting**

Adequate lighting is necessary to see the steps on stairs and to detect objects. Light measurements taken during the day in participants' homes, with artificial lighting switched off, found 61% of households to have light levels of 50 lux or less. Recommendations for the workplace have this level of illumination as appropriate for areas visited infrequently, requiring limited perception of detail (Howarth, 1995). Among the households where low illuminance readings were found, 23% of participants reported not switching on stair lights during the day.

When asked about use of lights, 11% of interviewees mentioned cost as being a factor limiting their use of lights. For example:

"It's a habit from years ago when I was poorer."

"I was taught as a youngster to save money."

In other cases, participants were influenced by the behaviour of other people living in the house. For example:

"At night my husband will not use the lights if he goes down stairs.  
He feels the steps with his feet and complains at me if I use the lights."

"My husband considered the cost and I do now."

Using stairs at night without switching on lighting seems likely to increase risk of falling on stairs, a point which most interviewees recognised. Almost one fifth of interviewees (18%), however, reported not using lights should they come downstairs after going to bed. A variety of explanations were given for this, including presence of sufficient illumination from

outside, eyes already adapted to the dark, and individuals being familiar with their own stairs. When night illumination readings were taken in a selection of households, levels were un-measurable with lights switched off. In the dark, people seem to use the small amount of illumination that is available to detect cues in the environment. Combined with touch, this allows them to find their way up and down stairs. Problems may occur, however, in the event of unforeseen circumstances, such as stepping on an object or perhaps encountering a pet.

#### **5.1.6 Use of handrails**

Making use of handrails was something study participants highlighted frequently as an essential aspect of safe use of stairs: "I always use the handrail. It's fear, and I don't know why." This is in line with the findings of previous research that the use of handrails aids stability, assists in recovering from stumbles, and helps to reduce the incidence and severity of stair accidents (Templer, 1992). Two thirds of participants (72%) reported that they use the handrails every time they use their stairs. Those participants living in homes with two handrails reported having problems when using stairs with only one rail.

#### **5.1.7 Stair design**

Some participants commented that they find it necessary to descend stairs with their feet positioned sideways, owing to the size of the tread being insufficient to fit their whole foot. The Building Regulations recommend a minimum going of 220mm for private housing, which Roys (2000) identified as smaller than the foot length of 95% of the adult population (or 100% if 30mm is allowed for shoes). In the present study, the mean going of 214mm was smaller than the minimum recommended. With average foot lengths of participants being 267mm for men and 243mm for women (unshod), it is clear that it is common for an individual's foot length to exceed the size of the steps on their stairs.

### **5.2 Behaviour affecting stair environment**

Distinct from actions involved in the direct interaction with stairs is behaviour which affects the safety of the stair environment.

#### **5.2.1 Leaving objects on stairs**

Items placed on stairs can be a trip or slip hazard, or may form an injurious object to fall into. Objects may be positioned on stairs on a temporary or more permanent basis, with many instances of both types found in the homes of participants in this study.

Discussions with interviewees revealed that items placed on stairs on a temporary basis might be taken up or down shortly afterwards, or would sometimes be left there for several days. It is self-evident that the longer something remains on the stairs, the longer it forms



a hazard, especially if left over night. Almost two thirds of the study participants (64%) said they could foresee problems with leaving objects on stairs yet, predominantly, they were the same people who actually did this. The probable explanation for this apparent contradiction lies in the accounts given by individuals of how they place objects on stairs, indicating that in their case they believed the practice to be safe, for example:

"It's safe the way we do it, the objects are usually small and placed to one side,  
not in the middle where we walk."

" I am careful what I leave on the stairs,  
I come down the stairs on the other side to the objects."

Although a person may feel that the way in which they leave an item on stairs is safe for them, this might still cause difficulties for another member of the household, unaware that something is there. Also, in some circumstances, it may not be possible for someone descending stairs to see an object, if this is small and obscured from vision by the step above. Someone placing an object on the stairs looking up may be unable to appreciate this problem. The possible danger is illustrated in the following example:

"I was going to bed and came downstairs again, my husband had  
put his shoes on the 2nd or 3rd step up ready to take up to bed with him.  
I did not see them and trod on them, slipped and hurt my back."

Another situation that may arise is visitors leaving objects on stairs. One focus group participant highlighted the problem of children leaving toys on the stairs:

"I'm always careful with the grandchildren, to make sure that they don't leave  
things on the stairs ... I always make sure that sticklebricks and things like that aren't left,  
as that's a major hazard I think."

Some participants have recognised the risks of leaving objects on the stairs and reported a number of reasons for this:

"It can be dangerous, especially when I am wearing my bifocals."

"We have both had accidents in the past tripping on objects on the stairs,  
so we leave things to go up in the kitchen."

It is interesting that a significant inverse relationship was found between leaving objects on stairs and (i) increased age ( $p < 0.01$ ) and (ii) decreased functional ability ( $p < 0.01$ ). It is uncertain whether this is because those with increased frailty are more aware of the risk or, perhaps more likely, because reduced mobility prevents an individual from engaging in the behaviour.

With regard to permanent objects, furniture, such as bookcases, tables and other large items, is often placed at the top or bottom of the stairs or on half-landings. In the households surveyed, the practice of using half-landings for furniture was more common in detached houses ( $p < 0.001$ ), but of course this may simply be due to half-landings being more prevalent in detached houses. Instances were found in the survey where objects were stored permanently on stairs, more prevalent in terraced houses ( $p < 0.001$ ), perhaps owing to restricted space elsewhere within the home.

It is in the nature of people that an item of furniture may be left in place for many years, without it being something that the owner thinks about. Until an incident occurs, there may be nothing to prompt a person to regard a piece of furniture as a potential hazard. Even if the householder is aware that it may cause a problem, they may not be able to move it themselves or perhaps do not have access to someone else who could move it for them. Equally, they may just not have got around to making a change:

*"I know it shouldn't be there, you coming has made me think I should move it.  
I have just not got round to it."*

Stairlifts are a special case, generally installed where someone in a household has a particular need. However, for other members of the household who do not use the stair lift, its presence can markedly reduce the width of stairs and have the potential to cause serious injury in the event of a fall (figure 4.13). Advice offered by the DETR is that it is important that the chair or carriage of a stairlift is able to be parked in a position that does not cause severe obstruction to either the stair or the landing (Burd, 2000, personal communication). There is no obligation in this respect, however.

### **5.2.2 Environmental lighting**

Poor lighting has been suggested as a contributory factor in many fall accidents (Templer, 1992), although precise lighting requirements for different types of user are difficult to specify. In this survey, many respondents (75%) identified low light levels as increasing the risk of falling on stairs, although bulbs of less than 100W were in use in almost half of homes visited (44%). Combined with this, some households also had lampshades of a design further restricting levels of lighting, for example the solid plastic design shown in figure 5.2. Open lampshades, such as shown in figure 5.3 allow higher illumination.

Figure 5.2 Solid plastic design lampshade (household 028)



Figure 5.3 Open design lampshade (household 124)



A number of participants had low energy, low wattage light bulbs fitted at the top of the stairs. This type of luminaire requires changing much less frequently than a traditional incandescent light bulb, thereby reducing the possibility of falling when changing the bulb:

" I put a low energy bulb upstairs so I would not have to change it very often."

A second advantage is reduced cost of operation, allowing people to leave stair lights on without the worry of large electricity bills. Examples of some of the comments made by participants:

"I use low energy bulbs so I can leave the light on during winter."

"I replaced ordinary bulbs with low energy bulbs to save money."

However, there was resistance by some participants to using low energy light bulbs. The design of the lampshade was mentioned, with low energy bulbs 'not fitting' the shade. Other problems raised were:

"I am not keen on low energy bulbs as they seem to flicker."

"I had used low energy bulbs in the past, but it drove me mad waiting for it to come on."

### 5.2.3 Coverings

Although most participants (86%) reported their stair coverings to be in reasonable condition, on inspection by the researcher many (29%) were judged to be in need of replacement or repair. It seems likely that either the interviewees had a lower threshold for what constitutes reasonable condition, or else they had not noticed wear and tear that may have happened gradually over many years. It is unclear from the following account whether the participant was aware the carpet was damaged before the fall, or if he became aware of it as a consequence:

"I was going downstairs and my heel caught on a tear in the carpet,  
I fell forward onto my knees."

However, the interviewee reported that a new stair carpet had been fitted soon afterwards.

Even if a householder is aware that a stair covering is in poor condition, there may be obstacles to installing a replacement. These include: expense, difficulty involved finding a replacement, disruption during fitting, or believing that awareness of the damage will be sufficient for them to avoid having an accident. Coverings in households where the stairs are steep (i.e. the riser high and the going short) tended to show more signs of wear. In these circumstances, the shoe heel may come into frequent contact with the carpet, on the leading edge of the tread or the top of the riser, resulting in premature wear.

The pattern and colour of carpets may make it difficult to detect step edges in some circumstances (figures 4.10 and 4.11). Generally, coverings light in colour and non-patterned make steps more visible, whereas those that are heavily patterned tend to camouflage the edges of steps. Part of this is due to the pattern making it difficult to judge depth and position, with patterns incorporating horizontal and vertical lines appearing to cause a particular problem (Cohn and Lasley, 1985 and 1990). These effects may be increased for those with poor visual acuity, poor visual stereopsis, or who do not wear their spectacles. Given the limited awareness of possible implications of stair colour and patterning, these issues are unlikely to be considered by older people when selecting stair carpets or other coverings for their home.

#### **5.2.4 Handrails**

There is wide agreement on the importance of appropriately designed and fitted handrails (Templer, 1992). To prevent a fall, the rail needs to be capable of taking the weight of a person when they pull on it. In a number (10%) of households visited during the survey, the handrail was judged to be in need of repair.

A reasonable proportion (34%) of homes had at some time had a second handrail fitted. Generally, interviewees with a second rail fitted to the stairs had lower functional ability ( $p < 0.05$ ), suggesting that a need for additional support using the stairs had been recognised. These respondents often spoke favourably of the second rail, mentioning that it allowed them to use their stairs with increased confidence. An example of this can be seen in the comment made by a 94 year old man who had a second rail fitted recently

"My son made me have it fitted, but now I can go up and down faster."

If there is a rail either side this gives the user the option of using both rails at the same time, or holding just one rail but having the choice of which hand to use. Some individuals may have a preferred or stronger hand, particularly those who have suffered a stroke. One participant said:

"I feel all houses should have 2 rails, if people have a weakness in one hand then having just one rail will increase their risk of falling."

In many (28%) of the households with 2 handrails, the second had been fitted on the advice of a community occupational therapist, or a social services community care worker. Often these participants remarked on the extended time it took from the recommendation to the handrail being fitted, with their difficulty using the stairs continuing until it was installed.

Handrails that are easy to grip are the preferred type, the 'round pole' type (figure 5.4), with a circumference of approximately 220mm, being the most comfortable and easiest to use (Templer, 1992). Rails that are difficult to grip, such as the ranch style rail shown in figure 5.5 were identified by participants as less desirable:

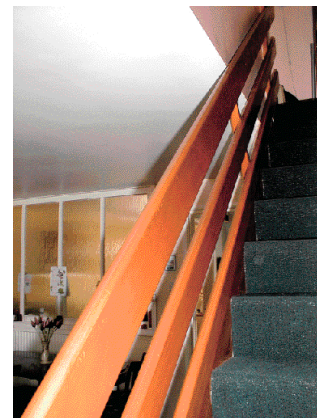
"The rail is the wrong shape to get my hand round, it's too square and narrow."

Various other combinations of rails were seen, designed to make using the stairs safer and to increase confidence, for example figure 4.3. In this instance the extra portion of handrail provides support right to the top of the stairs and reduces the risk of falling backwards at this point. Grab rails were also fitted to a number of stairs to fulfil a similar need.

Figure 5.4 'Round pole' style handrail (household 016)



Figure 5.5 'Ranch' style handrail (household 059)



Although many participants (41%) with a single handrail fitted to the stairs, said they thought they would need another handrail in the future, this does not necessarily mean they will actually have one fitted. Participants cited various problems as deterring them from obtaining a second rail, such as expense and knowing whom to approach to have one installed.

### 5.2.5 Smoke alarms

Although smoke alarms were not examined specifically in the environmental survey, a number were seen positioned over the stairs. In these circumstances, it may be difficult for



the householder to test the alarm or change the battery, without putting themselves at risk of falling. Official guidance on the location of smoke detectors has been improved, so as to facilitate safe testing and maintenance, and will be of benefit in the future (Fothergill, 2000, personal communication). However, there may be obstacles to older people repositioning devices already in place. In these circumstances, it seems desirable that there should be guidance and help available with this problem from support agencies.

### 5.2.6 Landing windows

Access to landing windows can be a problem depending on the layout of the building. In the example shown in figure 5.6, the participant gave the following description of how she gained access to clean and change the curtains:

"I have to place planks of wood from the upper banister to the window sill and then walk across to the window. I don't feel at all secure when I do this."

Figure 5.6 Landing window located above stairs (household 132)



Clearly, it is undesirable for a landing window to be located in this position, and the Building Regulations now cover this issue. Where windows already exist that are difficult to access, a number of instances were seen in peoples' homes where they had acted to reduce the need to maintain them by, for example, not having curtains, or having frosted glass (which needs cleaning less frequently).

### 5.3 Behaviour affecting individual capability

In addition to the manner in which individuals interact with their stairs directly, or actions they might take which affect the stair environment, people can also behave in a manner which affects their own capability.

### **5.3.1 Medication and alcohol**

Alcohol and prescribed medications, either alone or in combination can affect judgement and balance. Over one third (38%) of participants reported drinking alcohol when taking prescribed medications, giving various explanations for doing so:

"I don't drink enough to affect the medication,  
anyway I wait some time after taking the tablets before I have a drink"

"What does it matter at my age?"

It seems there may be scope to improve individuals' knowledge of when they personally might be at increased risk from a medication, or through mixing a medication with alcohol. This might be achieved through improved communication of medicine instructions to older people and their carers, regarding use and possible side effects, and by raising awareness of the extent to which alcohol consumption contributes to falls among this age group (Wright and Whyley, 1994).

### **5.3.2 Use of spectacles**

Almost all (99%) of the sample reported using spectacles, with over half (57%) having bifocal glasses. A research question raised by this study is to what extent bifocal and varifocal spectacles might be a contributory factor in falls on stairs. Of participants who wear bifocal spectacles, 20% reported that they cause problems when worn while descending the stairs. These include difficulty judging depth, with consequent uncertainty locating steps, and distortion. Various methods were reported as used to reduce problems associated with using bifocals, such as positioning the head, so the wearer is not looking through the portion of the lens that causes the visual distortion; not looking at the steps, but looking ahead to the bottom of the stairs; and not wearing glasses at all when using the stairs. This option, of course, creates different risks for an individual. When not wearing spectacles, a person may be unable to see possible obstacles on the stairs, such as objects placed there or pets. Visual stereopsis is also affected by non-wearing of glasses, affecting judgement of depth.

Some participants (27%) reported that they had been warned by their Optician or Optometrist of the need for care when using stairs, and for stronger prescriptions, the distorting effects on vision are readily apparent. Participants mentioned that they adapt to wearing bifocals, reporting that single steps and street curbs cause them the most problems. However, whether this compensatory behaviour actually occurs and, if so, whether it is sufficient to prevent falls is unknown.

### 5.3.3 Exercise

Encouraging increased levels of physical activity has been identified as having a valuable role in reducing the incidence of falls among older people (HEA, 1999). Exercise can maintain strength, improve coordination, increase reaction time, and help prevent osteoporotic fractures. A small proportion of participants (10%) recognised that using stairs could be beneficial in this respect:

"I make a point of using the stairs for exercise, but I don't make unnecessary journeys."

"If the weather is bad and I can't go out, I use the stairs for exercise."

Some participants reported using the stairs to exercise when, perhaps, this might be unwise:

"I only use the stairs to go down to exercise my knees,  
then I use the stairlift to go back up."

This participant had experienced a serious fall on the stairs and had been told to keep exercising her legs. As part of this, she made a point of walking down stairs, although her abilities had declined to the extent that she needed to use the lift to reach the upstairs of her home. Advice encouraging use of stairs for exercise needs to consider the increased risk this might create for some individuals of falling.

While moving to a bungalow will inevitably reduce the risk of falling on stairs, it emerged from the focus groups that stairs and steps in shops or friends homes may then become more difficult to negotiate. The term, 'bungalow legs' was used by one person to describe the difficulty and aches and pains her husband experiences on the stairs after a period of living in a holiday bungalow. There may also be a psychological effect accompanying reduced stair use, leading to increased apprehension on the occasions on which they are used:

"You sometimes get a bit frightened. I don't like stairs, from not having stairs for 10 years. When I go and stay with my two daughters, and they've got some very steep stairs, and I hate those stairs, I really hate them. I take so long coming downstairs, I really don't like them."



## 6 CONCLUSIONS

This research has improved understanding of how older people use their stairs, and highlighted the prevalence of factors affecting safety. Many instances were found where the behaviour of older people may act to increase the risk of falling on stairs. This may arise from the way a person uses the stairs, as a consequence of actions which modify the stair environment, or through behaviour affecting individual capability. While many participants were able to recognise important hazards once prompted, many had not given much thought to stair safety prior to this. Fortunately, the study findings indicate various opportunities for prevention.

Wherever possible, the primary measure in accident prevention should be to eliminate hazards through design. In the case of falls on stairs, dwellings can be influenced through building standards, but as the greatest impact of these is on new homes, it takes time for improvements to have wide effect. Recent developments in Building Regulations have included a requirement for a lavatory downstairs in all new houses, and research is underway examining the design of safe stairs, particularly on the size of the going (tread). Both these areas have been identified by research as having risks that can be reduced. A valuable remedial action is the fitting of second handrails as these aid stability and increase confidence.

There is also scope for improvement with equipment installed or used around the stairs, for example the provision of more appropriate tools for cleaning this area. A second telephone located upstairs can avoid pressure to rush down stairs to answer a call. Door intercom systems may eliminate the need to hurry to deal with a caller at the door. Intruder alarms can be installed with control panels both upstairs and down, to reduce the perceived urgency when setting or cancelling the system.

Previously evaluated interventions to help prevent falls such as exercise and dietary change also have a clear role to play in all falls, including those on stairs. Indeed, the use of stairs as a form of exercise should not be underestimated.

Beyond this, efforts to reduce falls need to raise awareness of risks and provide guidance and support to help people deal with these. It is disappointing, although perhaps not surprising, that only 13% of participants reported ever having received any advice on stair safety. This is an obvious matter to address. Routes for safety education are many and approaches need to be tailored to different circumstances. It may be appropriate to begin this process at the time people retire, when most are still active enough to be able to make changes to the physical environment, avoiding problems that may develop in communicating with some people as they age (Wright and Whyley, 1994). Once individuals do become less able to do things for themselves, relatives, carers and support agencies have a critical role to play. These groups, in turn, also need encouragement, information and advice, to raise awareness of hazards and to help reduce the risk of falling on stairs among older people. The DTI's safety awareness campaign "Slips, Trips and Broken Hips" is a welcome initiative to enhancing awareness to prevent falls.

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## APPENDIX A - PRELIMINARY FOCUS GROUPS METHOD AND RESULTS

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## A.1 METHOD

The study used discussion-based focus groups as an effective method of gaining preliminary insight into the problem (Morgan and Krueger, 1998).

### A.1.1 Participants

Sampling was on a convenience basis, with the primary criterion of participation being an age of 65 years and over. Individuals were recruited from existing subject lists, compiled for previous research studies on risk of osteoporotic fracture in women (Brooke-Wavell et al, 1995), with additional subjects obtained from local community groups. As a consequence, the sample comprised more women than men. The final sample consisted of 20 females and 4 males, with ages ranging from 65 to 79 years (mean = 70.6, standard deviation = 2.71). This imbalance was considered acceptable (see discussion).

Participants formed three groups, each group meeting on a separate occasion. Numbers in each group were 6 (4 females, 2 males), 7 (6 females, 1 male) and 10 (9 females, 1 male). There were 2 married couples within the sample of 24, resulting in contributions from 22 households. The composition of the groups covered a broad range of housing, ranging in age from 10 to 100+ years old.

### A.1.2 Procedures

Participants were briefed both verbally and in writing about the study prior to arrival. They were informed that the discussions would consider stairs in the home and were asked to think about how and why they use their stairs, what risk factors and what safety issues might be involved.

Upon arrival, participants were invited to read a leaflet from the UK government (DTI) 'Avoiding Slips, Trips and Broken Hips' campaign. This aims to reduce falls in all areas of the home. As well as practical suggestions, the advice covers physical fitness, diet, clothing, lighting, and housekeeping. In addition, photographs were circulated showing examples of different types of stairs. The purpose of the briefing was to encourage thought and to promote discussion.

Each meeting lasted approximately 1½ hours, was conducted in line with the approach described by Morgan and Krueger (1998), and was lead by a principal and assistant moderator. Topics covered by the sessions were:

- circumstances in which stairs are used
- factors affecting safety on stairs
- age-related factors leading to increased risk of falling
- self-perceived safety on stairs
- immediate and longer term consequences of having a fall
- value and acceptability of preventative measures

## A.2 RESULTS

A systematic approach was employed for the analysis of results, where participant contributions were coded initially by the assistant moderator according to theme and opinion. By way of validation, the coding was then independently reviewed by the principal moderator and an additional experienced researcher from the project team.

### A.2.1 Environmental Factors

Within the focus groups, environmental issues were discussed at greater length than other aspects of stairs and their use.

#### A.2.1.1 General Stair Design

Some participants commented that the size of steps ought to be sufficient to accommodate a full foot. It was suggested that small steps with a steep drop lead individuals to come down stairs sideways. It was also emphasised that stairs should not be too steep, and there should be equal step heights throughout a staircase: "...sometimes you go to places, and that one's like that, and the next one's like that, and good heavens." Stairs with open risers were disliked by some, reducing confidence due to being able to see through to the floor below: "There's just a funny feeling, there's a space there in front of me." Landings were identified as beneficial, allowing rests and, in the event of a mishap, the distance to fall is less than with a straight flight of stairs. Stair width was also thought important, to enable people to pass safely and to allow for installation of a stairlift, should that become necessary.

Stairs in other people's homes may pose a particular problem:

"We've just come back from our older daughter's house in London, and her stairs are an absolute nightmare, they're steeper, it's a much older house, there isn't a handrail."

On occasions, it seems problems with the environment may be compounded by lack of familiarity.

#### A.2.1.2 Stair Covering

Stair covering was viewed as an important safety issue. Well fitting, carpeted stairs, in a good state of repair, were thought to be safer than polished wooden stairs. An instance was presented where an ill-fitting carpet had caused a fall:

"My husband had warned me. We'd been decorating, and we'd just put the stair carpet back, but he said, "be careful, as I haven't got it right yet". Well, I got up in the night to go to the toilet, which was downstairs, and of course I'd forgotten what he'd said, as you're not really awake are you. The stair carpet moved, and I just slid down on my bottom."

### **A.2.1.3 Handrails**

A dominant aspect of all three focus groups was the perceived importance of handrails. They were universally regarded as an essential feature of a safe staircase: "I always use the handrail. It's fear, and I don't know why." Handrails were said to be used more often than not, and frequently out of habit: "...it's just automatic I suppose". However, there were differences in reported use of the handrail, with some using it for reassurance on the way down: "It's there, just in case", while others rely on it to pull themselves up, for example: "My second handrail is slightly smaller than the original, and that is easier to pull on." The need to use the handrail may be greatest when carrying something: "...if I've got the ironing, I've got it on one arm, but I always hold the rail with the other."

Of the 22 households covered by the focus groups, only 2 had a second handrail, both of which had been fitted specially. Other people had thought about fitting a second rail, but had "...just never got round to it." One lady said that she had thought about a handrail for the steps in her garden, but had dismissed the idea as unnecessary: "Well, you just think I can still do it, kind of thing...". Having spoken to others in the group, she said that she may now reconsider this. Some had never thought about the option of a second rail.

The design of handrails was also viewed as important, with it noted that ideally they should be of a shape and size to allow a strong grasp: "...it is safer to have a full hand grip."

### **A.2.1.4 Environmental Aspects of Lighting**

Lighting was discussed as both an environmental and behavioural factor. Focus group participants highlighted the desirability of having adequate levels of natural light during the day: "These stairs that are in the middle of the house, they have no light anywhere, they're pretty lethal during the day." Conflicting with this are problems connected with the positioning of windows:

*"The morning sun tends to hit me as I open the curtain...you think you're OK,  
but are really blinded and don't find out until you walk down the stairs."*

It was also agreed that artificial light should be of a good level, for use on dull days and at night. Long-life light bulbs (compact fluorescent) were discussed, provoking mixed reactions. A number of respondents judged long-life bulbs as being safer than ordinary bulbs, as they need to be changed less often. Against this, others mentioned problems due to the bulbs taking longer to 'warm up' to produce their maximum illumination: "...when you first put them on, they're very dim, aren't they? It takes quite a while to build up."



## **A.2.2 Behavioural Factors**

### **A.2.2.1 Patterns of Use**

The focus group participants reported using their stairs throughout a typical day, whenever the need arises. There may be more frequent use on days when housework is undertaken. Another common reason given for using the stairs is needing to use the lavatory (many dwellings in the UK have only a single WC, located upstairs), or getting ready to go out: "Well, if you go out, you often have to put your coat on upstairs, change out of your slippers, that sort of thing." In addition, some responses indicated that forgetfulness may lead to increased stair use, causing repeated journeys to fetch something or complete a task.

It was generally agreed that operations such as opening and closing windows and maintenance, for example cleaning and changing curtains, can also create danger. This was supported by one report of how a person fitting curtains had experienced a fall on the stairs:

"My daughter-in-law moved into a cottage, and she was fitting curtains, and stepped back and fell down the stairs."

### **A.2.2.2 Carrying Items**

It was widely thought that carrying bulky or heavy items increases the risk of falling on the stairs. There were several reasons presented for this (i) the handrail can become inaccessible, (ii) vision is obscured, (iii) balance is altered, and (iv) muscles are under additional strain. Strategies used to enable people to manage alone included counting steps where the field of vision is obscured, and throwing laundry and other unbreakable things down the stairs to avoid the need to carry them. Some participants had two vacuum cleaners, one stored upstairs, the other down, eliminating the need to carry it up and down (except when actually cleaning the stairs).

### **A.2.2.3 Leaving Objects on Stairs**

There was unanimous agreement that leaving objects on stairs increases the chances of having a fall, with objects both reducing the usable width of the stairway and forming a hazard to slip or trip on. However, this did not prevent participants from continuing to store or temporarily place objects on their stairs. Most admitted to leaving things on the stairs: "...ready for the next journey up" or to alleviate having to carry too much at one time. The discussions suggested that items left on the stairs are usually small items, such as shopping or laundry and are put: "...to one side on the bottom two or three steps", "...where people aren't going to walk", "...and then the next time you go up, you take them with you." A further source of objects on stairs can be grandchildren leaving their toys. This was mentioned as requiring special attention:

"I'm always careful with the grandchildren, to make sure that they don't leave things on the stairs ... I always make sure that sticklebricks and things like that aren't left, as that's a major hazard I think."

#### **A.2.2.4 Hurrying**

Although there was general agreement among focus group participants that hurrying on the stairs increases the likelihood of having a fall, people appear to continue to do it. The most common reason given for hurrying was to answer the telephone or doorbell, prompted by a concern that callers will not wait.

To make answering the telephone easier, many people had installed a telephone extension upstairs. Also, the introduction by British Telecom in the UK of a number recall system, whereby telephone users can dial '1471' to be told the telephone number of the last caller, was mentioned as alleviating the problem to some extent. However, it was suggested by a focus group member that people still rush:

"We're all from an age where we used to rush for the phone, surely,  
I mean the phone was dominant at one time...you always think that it's going to be  
something important. There is still that tendency to rush."

A further cause given for hurrying on stairs was the setting or cancelling of intruder alarms:

"We can isolate the upstairs fortunately, but if you forget to do that, you've not got a lot of  
time to race downstairs and switch it off. That can be hazardous."

#### **A.2.2.5 Use of Lighting**

While there was wide agreement on the importance of adequate lighting on stairs and the need to use artificial lighting at night and when daylight is poor, some reported behaviour contradicted this. While some participants stressed that they always switch on the light, a proportion of the sample admitted that they often use their stairs in the dark, with the justification that they know their way around their own home. Other explanations for not using the light at night included not wanting to disturb others who are sleeping: "...but I don't, so I don't disturb my husband I think", or to make it easier for themselves to get back to sleep: "...and I don't switch the light on either, but I know why I do it. It's because I think I'll be able to go back to sleep again quicker and easier if I don't actually put the light on."

A variety of methods were reported as used by participants to help them to manage stairs in the dark. These included counting steps, holding the banister, and feeling the environment for cues:

"I have an awful habit of going upstairs in the dark, and coming down,  
but I count the stairs. My daughter plays up with me for doing it."

#### **A.2.2.6 Footwear and Clothing**

Problems with footwear and clothing were discussed by many participants as being hazardous on the stairs. One respondent commented that people use stairs without "...planning their journey" and, as a consequence, people do not think about what they are wearing. Footwear that fits well and which allows proper grip and feeling was considered desirable by the sample. Flip-flop shoes, high heels, 'mules' and poor fitting slippers with little grip, were thought dangerous. In one case, a lady explained how she would take off her flip-flops and go up the stairs in bare feet as she felt this to be safer. Long night dresses and dressing gowns were mentioned in the discussions as being a problem, due to a risk of tripping on the hem.

#### **A.2.2.7 Cleaning**

A number of participants reported that cleaning around the stairs, particularly using a vacuum cleaner, becomes increasingly difficult with age. Some had overcome this by using a battery operated hand-held cleaner: "...and I have got a smaller one which I use on the stairs, which is very useful, because you can actually hold it, it's lighter." Other aspects of cleaning, such as accessing certain designs of window, were also considered dangerous.

#### **A.2.2.8 Pets**

The focus group discussions revealed two aspects of keeping pets that have implications for stair safety. On the one hand, there may be occasions when a pet can be a tripping hazard, with some individual pets worse for this, depending on their behaviour. A second influence is where pets cause additional stair journeys, through needing to be let in or out of the house, sometimes at night: "The dog sometimes wakes me if she wants to go out...".

#### **A.2.2.9 Stair Avoidance**

The consensus from each of the focus groups was that using the stairs less often and, at the extreme, moving into a bungalow, would inevitably reduce the risk of falling on stairs. The two participants who lived in bungalows explained that in both cases their moves were initiated by a family member falling on stairs:

"When I wanted to move, my husband wasn't very keen (on a bungalow).

Then his dad fell down the stairs at his home, and broke his leg. That's why I'm in a bungalow, because my father-in-law fell down the stairs."

It emerged, however, that when living in a bungalow, stairs and steps in shops or friends and families homes may become more difficult to negotiate. The term, 'bungalow legs' was used by one lady to describe the difficulty and aches and pains her husband experiences on

the stairs after a period of living in a holiday bungalow. There may also be a psychological effect accompanying reduced stair use, leading to increased apprehension on the occasions on which they are used:

"You sometimes get a bit frightened. I don't like stairs, from not having stairs for 10 years. When I go and stay with my two daughters, and they've got some very steep stairs, and I hate those stairs, I really hate them. I take so long coming downstairs, I really don't like them."

One participant recounted how a physician had advised not to move into a bungalow unless absolutely necessary:

"He's a doctor and he said no! You move into a bungalow when you can't walk up and down the stairs, it's very important that you keep doing it."

### **A.2.3 Age-Related Factors**

There were numerous reports from the focus groups of how specific age-related factors including poor vision, balance, muscle strength, reaction time, and forgetfulness, combine to make older people more at risk from falls on the stairs than other age groups. There was mention that some conditions can become progressively worse throughout the day, for example arthritis, and allowance may need to be made for this. Possible hazardous effects of medications were recognised by the sample. It was discussed that taking medications and, in particular, mixing them with alcohol, can increase the chances of having a fall.

Although the focus groups had highlighted the belief that declining abilities contribute to falls, a large majority reported little or no difficulty using the stairs themselves. Many of these participants, however, were aware of problems faced by older friends and relatives. Of those who did have problems, various strategies had been developed to retain independence. For example, coming down the stairs backwards or seated, one step at a time, were different approaches that had been adopted.

Participants were asked if they worried about the likelihood of having a fall. There were individuals among the groups who were very concerned for their safety, but the majority indicated that it is not something that they had thought about. Someone suggested that it should not be considered a 'fear' of the stairs, but 'respect' for them. It was recognised in the discussions that a fall could have not only physical, but also psychological consequences, affecting personal confidence and quality of life.

### **A.2.3.1 Spectacles**

The wearing of spectacles and implications for safety were discussed in each of the groups. As visual ability declines with age, the use of inappropriate spectacles was suggested by some focus group members as being a significant risk factor in falls among older people.

Problems with bifocals were described as affecting the ability to judge distances, for example: "...I'm forever hitting the floor with my feet, I think it's there and there's a big drop." Bifocal and varifocal lenses may create the need to angle the head to be able to see properly when coming down stairs, depending on the prescription. Several group members suggested this may have implications for balance:

"I think elderly people who have either bifocals or varifocals are at a disadvantage going downstairs, because of this necessity to get the head out of alignment with the body, in order to see properly."

Some participants also remarked that it is difficult to take a quick glance at anything. Wearing bifocals and varifocals was said to create the need to make a conscious effort to look at the next step: "You can't make a casual glance and then know where you are, you've got to think about it." Some participants reported that their Optician or Optometrist had warned them of problems and had given advice such as: "Don't be afraid to show your double chin."

### **A.2.4 Other Issues**

#### **A.2.4.1 Combination of Factors**

As with other types of accidents, it is widely accepted that falls on stairs, and consequent injuries are usually due to a combination of factors, none of which in isolation would cause an incident. As one participant recounted:

"I got into bed, I'd had a drink and realised that I hadn't got any meat out for Sunday, rushed downstairs and slipped. The shopping trolley was at the bottom, I wouldn't have hurt myself if it wasn't for the trolley ...I was off about a fortnight, I cracked my ribs. But that was my own fault, I had had a drink, and I had nothing on me feet."

#### **A.2.4.2 Raising Awareness**

The groups were asked if they thought that people should be made aware of the dangers. The consensus seemed to be that if the age group had been identified as at increased risk from falls, then they should be told of the dangers so precautions could be taken. When the concern was put to the focus groups that drawing attention to the problem of safety on stairs might affect the confidence of some older people, responses included two reactions. It was agreed that it might leave some people feeling older and less independent. However, a more prevalent view was that practical advice would increase confidence and allow individuals to remain in control of their lives. The nature of the advice that emerged from focus groups was along the lines of "Keep your mind on the job", and "Be aware of your limitations."

## REFERENCES

Brooke-Wavell K, Jones P R M and Pye D, Ultrasound and DEXA measurements of the calcaneus: influences of region of interest location, *Calcified Tissue International* 1995: **57**: 20-24.

Morgan D L and Krueger R A, *The Focus Group Kit*. Thousand Oaks, California: Sage, 1998.

## APPENDIX B - RECRUITMENT MATERIAL

B.1 Recruitment letter

B.2 Reply slip

B.3 Information sheet (given to subjects at start of interview)

B.4 Consent form



Direct Line: 01509 223485  
Fax: 01509 223940  
E-mail: L.D.Hill@lboro.ac.uk

October 1999

Dear Sir/Madam

### **Avoiding Slips, Trips and Broken Hips**

We are carrying out research to find out more about things affecting the safety of older people on stairs, and need help with the project from people aged 65 and over. The study is important because more than 54,000 older people injure themselves on stairs each year.

This study is part of the "Slips, trips and broken hips" campaign currently being run by the Department of Trade and Industry and Health Education Authority. The campaign gives advice on how to reduce the chances of having a fall in the home, and is supported by Age Concern and Help the Aged. The results from our research will help to improve future advice.

We need people of all levels of activity, living in all types of housing. The only criteria is that you need to have stairs in the home or steps of three or more outside. We are hoping to carry out interviews in the home, these interviews will be arranged at a time to suit you, and will not take up too much of your time.

This study is voluntary and all information you give will be confidential. We have no record of your address, and you will only be contacted again if you send back the reply slip.

If you are able to help and would like more information, please complete the enclosed reply slip and return it in the pre-paid envelope provided (no stamp necessary).

Thank you for your time.

Yours faithfully

Denise Hill  
(Research Associate)  
Health & Safety Ergonomics Unit



**THE SAFETY OF OLDER STAIR USERS**

**Reply Slip**

**I am interested in this study and would like more information**

**FULL NAME: (please print) -----**

**ADDRESS: -----**

-----

-----

-----

**TELEPHONE NUMBER : -----**

**If you are not interested in this study, it is not necessary to return this form.  
Thank you for your time.**



## Informed Consent

My name is **Dense Hill** and I am a researcher on a project entitled:

**The Environmental and Behavioural Factors Affecting the Safety of older Stairs Users**

This project is being undertaken on behalf of the Department of Trade and Industry and the results will be used for their campaign "Avoiding Slips, Trips and Broken Hips".

Thank you for agreeing to be interviewed. The visit will involve measurements of your stairs, some basic physiological assessments and a range of questions relating to your use of the stairs. The interview should not last longer than 1½ hours.

Before we start I would like to emphasize that:

- Your participation is entirely voluntary
- You are free to refuse to answer any questions
- You are free to refuse to do any of the physiological tests
- You are free to stop the interview at any time

The interview will be strictly confidential and your results will be available only to members of the research team. However, anonymous excerpts from the interview may be used when the results are published.

Please sign this form to show that I have read the contents to you and you have had the opportunity to talk and ask questions about the project.

\_\_\_\_\_ (signed)

\_\_\_\_\_ (printed)

\_\_\_\_\_ (date)

A report on the results of the project can be sent to your home address.  
Would you like a copy of this report?

**Yes**

**No**

# **Information Sheet**

## **Factors Affecting the Safety of Older People who use Stairs**

### **Purpose**

Slips, trips and falls are the most common type of accident in the home. The aim of this study is to investigate a wide range of factors that may increase the risk of an older person slipping, tripping or falling on the stairs.

The results will feed into the campaign "Avoiding Slips, Trips and Broken Hips" presently being run by the Department of Trade and Industry and will help to improve future advice on how to avoid these accidents.

### **What is involved**

The study involves one interview, which will take place in your own home at a time to suit you. The visit should take no more than 1 ½ hours.

During the interview you will be asked some questions, including:

- Whether you experience difficulty using the stairs
- If you have ever had an accident on the stairs
- What factors you think may increase the risk of falling on the stairs

There will be some measurements taken, these will include:

- Your height, weight and length of foot
- Your vision will be tested with a distance chart
- Getting up from a stool will test muscle strength in your legs
- A test to measure your grip strength

We will also ask you how many prescribed medicines you are taking daily.

### **Participation**

You will not be asked to do anything you do not want to do or answer any questions you do not want to. You are free to withdraw from the study at any time. Please tell the researcher of any concerns you may have.

### **Who will have access to your details**

Your results will be confidential. However, anonymous excerpts may be used when the results are published.



## APPENDIX C - FULL DETAILS OF METHODS AND COPIES OF QUESTIONNAIRES

- C.1 'Chances of falling'
- C.2 'Your stairs'
- C.3 Additional information for 'stair environment'
- C.4 'Stair environment' survey
- C.5 'Night light readings'
- C.6 'Participant information'
- C.7 Additional information for 'Ability to carry out daily activities' (MMBI)
- C.8 'Ability to carry out daily activities'
- C.9 'Stairs in the home'
- C.10 'Falls on the stairs'
- C.11 Additional information for 'physical measurements'
- C.12 'Physical measurements'
- C.13 Snellen chart

Participant No.....
---------------------

**What do you think about your stairs?**

<i>(Please cross one box per question)</i>	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
The stairs are too steep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The stairs are too narrow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The stairs are poorly lit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The steps are in need of repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The banister/handrail is in need of repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The stair covering is in need of repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The stairs <u>are</u> safe to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What are your reasons for your answer to “The stairs are safe to use”?**

--

**How do you think the following might affect the chances of you having a fall on the stairs?**

	Much more likely	More likely	Neither more nor less likely	Less likely	Much less likely
<u>Example</u>			<input checked="" type="checkbox"/>		
Using the stairs less often	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*(Please cross one box per question)*

	<b>Much more likely</b>		<b>More likely</b>		<b>Neither more nor less likely</b>		<b>Less likely</b>		<b>Much less likely</b>
--	-------------------------	--	--------------------	--	-------------------------------------	--	--------------------	--	-------------------------

Leaving objects on the stairs

Having the stairs light on during the night

Using a handrail

Using two handrails

Having worn stair carpet

**How do you think the following might affect the chances of you having a fall on the stairs?**

<i>(Please cross one box per question)</i>	<b>Much more likely</b>	<b>More likely</b>	<b>Neither more nor less likely</b>	<b>Less likely</b>	<b>Much less likely</b>
Using a Hoover on the stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using well fitting footwear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wearing bifocal or varifocal glasses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carrying objects up or down stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Taking daily exercise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hurrying while using the stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having regular eye check-ups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Having a telephone extension upstairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gaining access to a window over the stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



## **Additional information on the methods used in the ‘environmental survey’**

### **Stairs and steps**

Stairs and steps included in the environmental survey:

- Most frequently used flights of stairs, usually positioned between two main floors of the house, ground floor to first floor.
- Other flights of stairs within the house, usually leading to the attic or second floor and leading to the cellar.
- Outside flights consisting of three or more steps

### **Headroom**

Measurement taken from the lowest point on the stair well vertically to the step directly below.

### **Handrails - Circumference**

Where possible the full circumference was measured. Where this was not possible a measurement was taken round as much of the rail as was accessible.

### **Stair covering - type, colour and pattern, and condition**

Interviewers' subjective opinions

### **Wall coverings - colour and design**

Interviewers' subjective opinions

### **Objects on stairs**

Included both temporary objects and furniture

### **Reduction in width due to objects on stairs**

Measurement was taken from the object across the largest clear space to the stairs' string.

### **Do objects positioned at the top and bottom of the stairs cause an obstruction?**

Interviewers' subjective opinions

### **Day time illuminance readings**

Taken with a Minolta TL1 Illuminance meter with a sensitivity of 0.1 to 9999 lux

**Night time illuminance readings**

Taken in 13 houses with a Hagner E2X Digital luxmeter with a sensitivity of 0.01 to 199,900 lux

**Measurement of width of stairs**

Clear width measurement from string to string

**Measurements of steps**

Taken using a stair measuring device developed and manufactured at Loughborough University, based on a design Roys (1999, personal communication). This device measures the distance and pitch between two nosings.

## Stair Environment

Participant No.....

How many stairs make up the flight? Count number of risers

Is the riser open or closed?

Is the headroom unusually low at any point on the stairs? Describe and measure

### **Landings:**

How many half landings are there?

How many steps from the bottom of the flight does each half landing come?

Does the top step encroach into the top landing?

### **Winders:**

How many winders are there?

How many steps from the bottom of the flight does each winder come?

How many steps make up each winder?

--

What angle does each winder create? Approx 90° 180°

--

Which side is the handrail in relation to the narrow side of the winder?

Left rail

Right rail

Same side

Same side

Other side

Other side

General comments:

--

### Handrails:

How many handrails are there?

--

Sketch cross-section of handrail (*photograph*)

<u>Left - looking up the stairs</u>	<u>Right - looking up the stairs</u>







Circumference of handrail

<u>Left - looking up the stairs</u>	<u>Right - looking up the stairs</u>
mm	mm

Height of handrail. Measure from top of nosing to the top of the rail.

<u>Left - looking up the stairs</u>	<u>Right - looking up the stairs</u>
mm	mm

Is either handrail in need of repair? Explain

<b>Left</b> hand side of the stair when going <b>up</b>	<b>Right</b> hand side of the stair when going <b>up</b>
 <input type="checkbox"/> Wall, no handrail	<input type="checkbox"/> Wall, no handrail
 <input type="checkbox"/> Wall with handrail	<input type="checkbox"/> Wall with handrail
 <input type="checkbox"/> Bannister with vertical rails	<input type="checkbox"/> Bannister with vertical rails
 <input type="checkbox"/> Ranch-style bannister	<input type="checkbox"/> Ranch-style bannister
 <input type="checkbox"/> Bannister with intricate patterning	<input type="checkbox"/> Bannister with intricate patterning
 <input type="checkbox"/> Solid bannister	<input type="checkbox"/> Solid bannister
<input type="checkbox"/> No bannister, handrail or wall	<input type="checkbox"/> No bannister, handrail or wall
<input type="checkbox"/> Don't know	<input type="checkbox"/> Don't know
<input type="checkbox"/> Other arrangement <i>(please describe below)</i>	<input type="checkbox"/> Other arrangement <i>(please describe below)</i>

## Stair covering:

What covers the stairs?

- |  |                          |
|--|--------------------------|
| Short pile carpet                      | <input type="checkbox"/> |
| Long pile carpet                       | <input type="checkbox"/> |
| Middle carpeted - outer edge bare wood | <input type="checkbox"/> |
| Exposed wood                           | <input type="checkbox"/> |
| Lino/vinyl covering                    | <input type="checkbox"/> |
| Exposed metal or concrete              | <input type="checkbox"/> |
| Other                                  | <input type="checkbox"/> |

Specify other:

-----

Describe the pattern of the stair covering.  
(cross as many as necessary) (photograph)

- |                       |                          |
|-----------------------|--------------------------|
| Plain                 | <input type="checkbox"/> |
| Specify colour: ..... |                          |
| Small pattern         | <input type="checkbox"/> |
| Large pattern         | <input type="checkbox"/> |
| High contrast colours | <input type="checkbox"/> |
| Low contrast colours  | <input type="checkbox"/> |
| Other                 | <input type="checkbox"/> |

Specify other:

-----

In what condition is the stair covering?  
(Cross as many as necessary)

- |  |                          |
|--|--------------------------|
| Looks new, not damaged or worn             | <input type="checkbox"/> |
| Slight wear, but not frayed, loose or worn | <input type="checkbox"/> |
| Areas that are frayed                      | <input type="checkbox"/> |
| Areas that are worn                        | <input type="checkbox"/> |
| Areas that are loose and poorly fitted     | <input type="checkbox"/> |
| Other                                      | <input type="checkbox"/> |

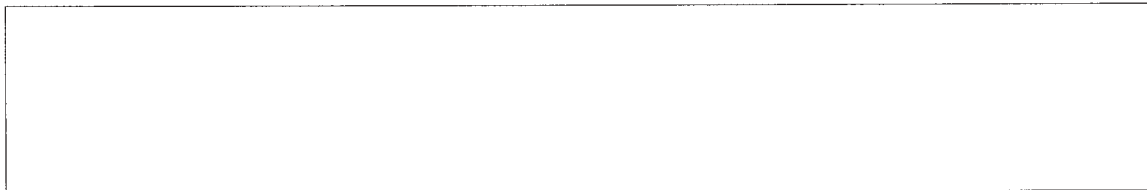
Specify other:

-----

Specify where the worn, fraying or loose carpet is (*photograph*)



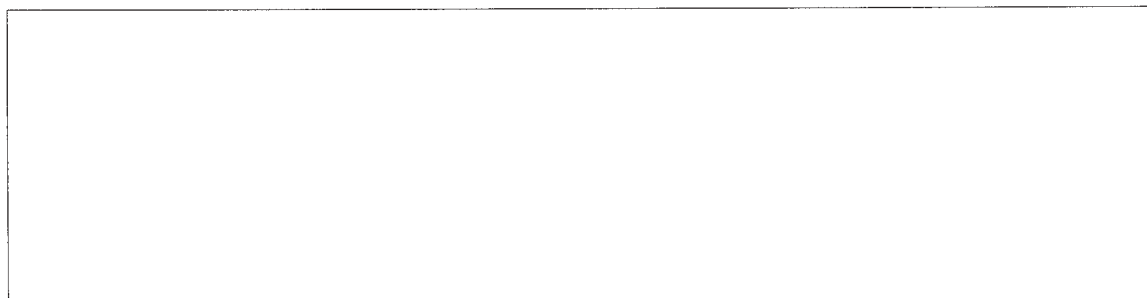
Other comments



**Objects on and around the stairs:**

Are there items left on the stairs?

- On how many steps and describe objects? (*photograph*)



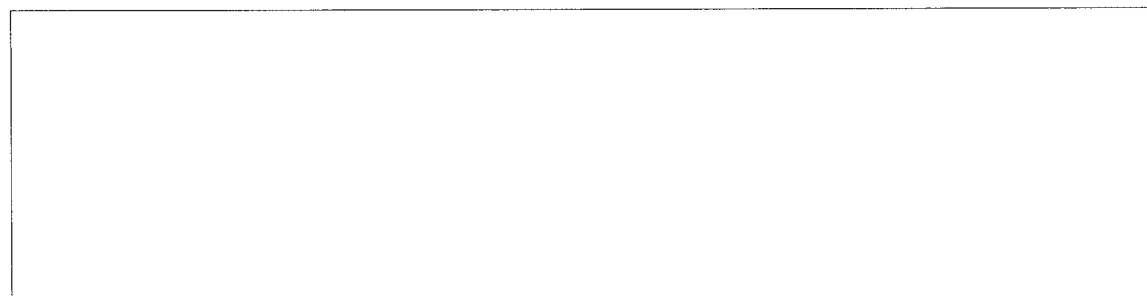
Measure reduction in width of step due to largest object on the stairs?



mm

Describe objects at the top of the stairs.

- Do they cause an obstruction?
- restrict access?



Describe objects at the bottom of the stairs.

- Do they cause an obstruction?
- restrict access?
- create something to fall into?

**Other issues on and around the stairs:**

At the top of the stairs are there any doors that lead directly onto the stairs?

Are there any loose rugs at the top or bottom of the stairs?

Are there any other distractions around the stair area?

- Mirrors, pictures, shelves



Describe the pattern of the wall covering  
(cross as many as necessary) (photograph)

- Plain
- Light coloured
- Dark coloured
- Small pattern
- Large pattern
- Other

Describe:

-----

### Landing windows:

Where in relation to the stairs is the window?

Comments

- No landing window
- Part-way over the stairs
- Completely over the stairs
- Not over the stairs

### Lighting:

Illuminance readings on the stairs	Bottom	Middle	Top
Lights off			
Lights on (if reading less than 50 lx)			

	Bottom	Top	Other
What is the wattage of the light bulbs?			
What type of light bulbs? O = Ordinary, ES = Energy Save, FT = Fluorescent tubes			
Do the bulbs work?			

Describe lampshades upstairs and downstairs (sketch) (*Photograph*)

<u>Upstairs</u>	<u>Downstairs</u>
-----------------	-------------------

**Measurements:**

Measure width of the tread

	mm
--	----

Measurements between steps		Distance mm	Inclination degrees	Nosing mm
From the floor to the first step (measure riser using tape)	Bottom			
First step – from the first nosing to the second nosing				
	1			
Three consecutive steps in the middle of the flight	2			
	3			
Step to half landing				
Riser from half landing to next step up				
Step to half landing				
Riser from half landing to next step up				
From the top landing to the next step down	Top			

Include photographs of:

	Done
1. View looking up the stairs	
2. Bottom of stair area	
3. Lamp shade bottom	
4. Position of light switches if in an unusual place	
5. Handrails on left looking up	
6. Handrails on right looking up	
7. Stair carpet looking up (encompass 4-5 steps)	
8. View looking down the stairs	
9. Top of stair area	
10. Lamp shade top	
11. Position of light switches if in an unusual place	
12. Stair carpet looking down (encompass 4-5 steps)	
13. Objects on the stairs	
14. Wall covering	
15. Positions of any landing windows	
16. Any, worn, frayed, loose areas	
17. Anything else of interest	

Any other comments:

Participant No.....

# Night Light Readings

Have you changed the wattage of the bulb since the previous interview?

Have you changed the light shades since the previous interview?

<b>Illuminance readings on stairs</b>	<b>Bottom</b>	<b>Middle</b>	<b>Top</b>
All lights on			
Landing light on/hall light off			
Landing light off/hall light on			
All lights off			

	<b>Bottom</b>	<b>Top</b>	<b>Other</b>
What is the wattage of the light bulbs?			
What type of light bulbs? O = Ordinary, ES = Energy Save, FT = Fluorescent tubes			
Do the bulbs work?			

## Participant Information

Participant No.....  
Present.....  
Date.....  
Time.....

How long have you lived in this house?

How many toilets do you have, where are they?

- If you have a second toilet did you have it fitted?
- Why?

Who else lives in the house with you?

What is the age of this property?

Postcode?

Type of house?

Do you have any restrictions on making changes to your house?  
(eg because it is rented)

### Other issues:

Approximately how long ago did you last visit the opticians?  
(eg 1, 2, 5, 10 years)

If any, what type/types of glasses do you use?

- Were they prescribed for you by your optician?

If you have not had your eyesight checked recently, do you think that you might need glasses?

Do you have any conditions that affect your vision?

	Yes	No	Details
Cataracts	<input type="checkbox"/>	<input type="checkbox"/>	
Glaucoma	<input type="checkbox"/>	<input type="checkbox"/>	
Macular degeneration	<input type="checkbox"/>	<input type="checkbox"/>	
Colour vision defect	<input type="checkbox"/>	<input type="checkbox"/>	
Other	<input type="checkbox"/>	<input type="checkbox"/>	

Please specify other:

-----

Do you use any form of walking aid?

**About you:**

Date of birth .....

M/F .....

Have you ever had any of the following?

	Yes	No	Details
Any dizziness on getting up quickly?	<input type="checkbox"/>	<input type="checkbox"/>	
Any other dizziness or balance problems? <i>(Meniere's disease, vertigo)</i>	<input type="checkbox"/>	<input type="checkbox"/>	
Any problems with circulation? <i>(high blood pressure, stroke, blood clots)</i>	<input type="checkbox"/>	<input type="checkbox"/>	
Any heart problems?	<input type="checkbox"/>	<input type="checkbox"/>	
Any respiratory problems? <i>(asthma, bronchitis)</i>	<input type="checkbox"/>	<input type="checkbox"/>	
Any joint problems or joint replacements?	<input type="checkbox"/>	<input type="checkbox"/>	
Any back problems?	<input type="checkbox"/>	<input type="checkbox"/>	
Any other major disease <i>(diabetes - age at onset, use of insulin + numbness in hands/feet)</i>	<input type="checkbox"/>	<input type="checkbox"/>	
Any serious injuries • Are you still affected?	<input type="checkbox"/>	<input type="checkbox"/>	

## Daily medications.

How many prescribed medications do you take daily?

How many non-prescribed medications do you take daily?

Do any of your medications:

- Affect your vision?
- Make you feel drowsy?
- Make you feel dizzy?

Did your doctor or chemist warn you about any of these side affects?



## **Modified 'Modified Barthel Index' (MMBI)**

### **Additional information 'Ability to carry out daily activity' questionnaire**

Participants were asked to rate their ability to perform a number of tasks of daily living. This questionnaire was developed from the modified Barthel index. A score of either zero or one was allocated for the participants' ability to carry out each activity, giving a total score for all the activities between zero and eight. The lower the score the more functional ability the participant considers they have and the higher the score the less functional ability.

Ability to carry out daily activities

Participant No.....

Please rate your ability to do the following activities

(Please cross one box per activity) I can do alone without difficulty    I can do alone, but with difficulty    I can do, but need assistance or equipment    Unable to do

Bathing / showering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dressing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking within the home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Light housework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heavier housework eg washing windows & floors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climb one flight of stairs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shopping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Stair use**

How often in one day do you generally use the stairs?

*(Each time you go up and down, count as once)*

- Never
- Once per day
- Two or three times, but avoid using if possible
- More frequent use, as necessary

If you use the stairs never, once or twice a day or avoid using if possible, why is this?

Are there any particular times during the day or night you use the stairs more than other times?

*(eg morning, afternoon, early evening –8pm, late evening/during the night +8pm)*

- What are the reasons for using the stairs more then?  
*(eg housework, use of the toilet)*

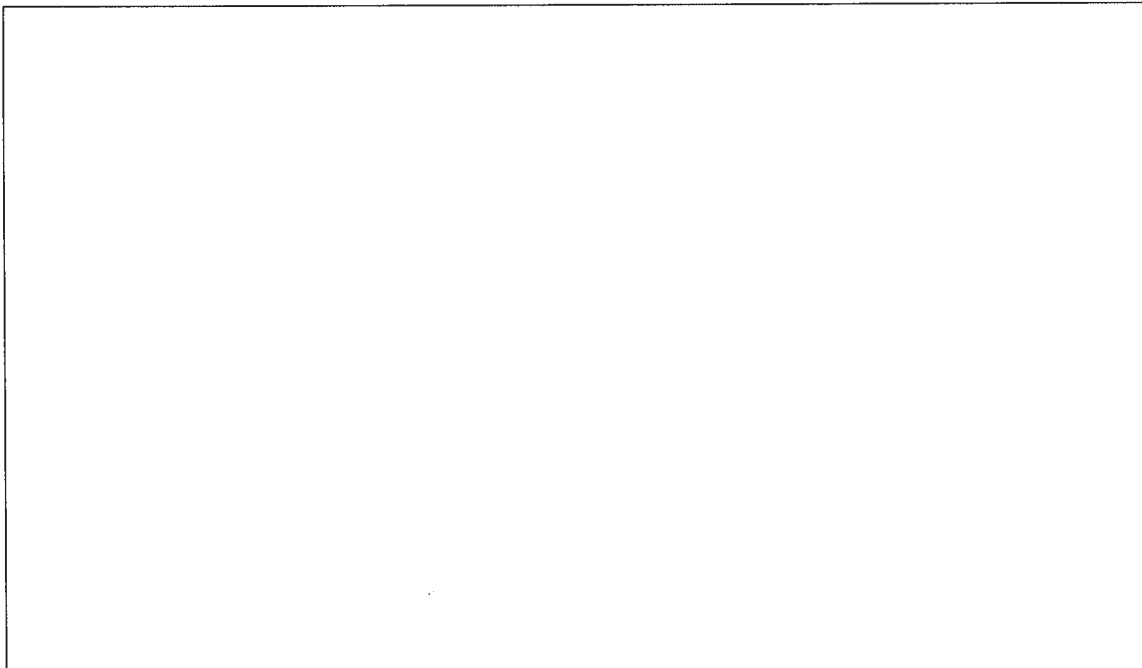
## Carrying things

What problems do you have when you carry things up or down the stairs?

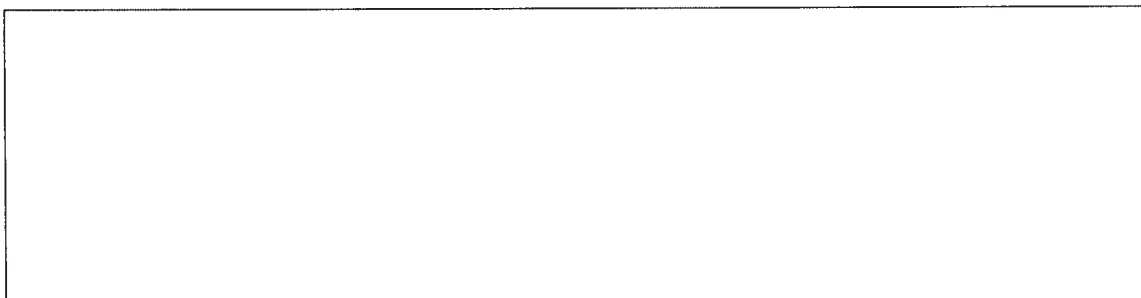
- Discuss carrying small items and big items.
- Being able to use the handrail
- Being able to see the steps
- Feeling “off balance”
- Have you developed any ways of carrying things so you feel confident when you are doing it?

*(eg move object over to one side to see step, carry in bag over shoulder so can still use rail)*

- Are the problems the same going up as for going down or are they different?



If you do have problems carrying things up or down the stairs do you ask someone else to do it for you?



## Hurrying

What kinds of things cause you to hurry when you use the stairs?

*(eg do you ever find yourself upstairs and the phone rings, or there is someone at the door, or you find you have forgotten something)*

Do you do anything to avoid having to hurry?

## Objects on the stairs

Do you ever put things on the stairs?

- Never, sometimes, often?
- What kinds of things do you put on the stairs?
- Where on the stairs do you put them and why?
- Do you keep things on the stairs?

Do you take them up the next time you go or do you sometimes leave them there?

- How long do they generally get left on the stairs?

Can you foresee any problems with leaving things on the stairs?

- Why do you do it?

## **Cleaning**

What methods do you use to clean the stairs?

- Do you feel that there are any risks with this method of cleaning?
- Can you think of any way you might reduce these risks?

## **Other activities**

What other things do you do on or around the stairs?

*(eg changing light bulbs, dusting pictures, decorating)*

- How do you do these things so you feel confident when you are doing them?

Discuss any “distractions” found in the stair survey

*(eg mirrors, shelves, pictures, furniture on half landings, clutter top/bottom of stairs)*

Does the landing window cause you any problems?

*(eg being able to open it, cleaning it, changing curtains, dazzle by the sun)*

## **Handrails**

### **If there is no handrail**

Why is there no handrail?

Have you considered having one fitted?

- If yes, why have you not done so?
- If no, do you think you should have one fitted?

Does not having a handrail cause you any problems or difficulties when you use the stairs?

### **If there is one handrail**

When do you use the handrail?

Do you have any problems holding onto the handrail?

Have you considered having a second handrail fitted?

- If yes, why do you think you need a second one and why have you not had one fitted?
- If no, do you think you might need another handrail fitting in the future?

### **If there are two handrails:**

Have you always had 2 handrails?

- When did you have the second one fitted?
- Why did you have it fitted?
- Did you see any advice about fitting a second handrail?

When do you use the handrail?

- Do you use both handrails?



Do you have any problems holding onto the handrails?

## Lighting

### During the night

If you get up in the night to go down stairs do you switch the landing light on?

- Do you still switch the light on even if you are not actually going downstairs
- Why?

### During the evening

When you go up or down stairs during the evening do you always switch the light on?

- Why?

If you do not use the light do you have any methods for safely going up and down the stairs in the dark?

*(eg count the stairs, use a torch, use the handrail)*

- How safe do you think they are?

Have you had an accident or nearly had an accident when you have not switched the light on?

Do you leave the landing light on all night?

- Why?

Have you considered or would you consider leaving the landing light on all night?

- Why?

**During the day**

How would you describe your use of lights?

Tend to use to a minimum, switch them off whenever possible

Tend to make a point of switching the lights on when it starts to get dull or dark

Don't bother either way

Do you ever find that you need to switch the stair lights on during the day?

Would you consider using brighter light bulbs on the stairs than the ones you already use?

- Why?
- Do you know the wattage of the bulbs on the stairs and landing areas?
- Have you replaced the landing bulb with a low wattage bulb?
- What wattage bulbs do you generally buy for the stairs?
- Why?

## Falls

How many times have you slipped, tripped or fallen on the stairs in your home or the homes of friends or relatives in the last 12 months?

**We are interested in any slips, trips, stumbles or falls you may have had in your home or the homes of friends or relatives, where either you hurt yourself or you might have hurt yourself.**

*(eg misstep top or bottom of the flight, tripping over a pet, foot not properly on the step etc...)*

- Have you experienced any other serious falls since becoming 65?
- Complete "Fall history" questionnaire as appropriate

<u>Last 12 months</u>	<u>Since 65</u>

If you have had a fall has this made you:

- more fearful?
- more careful?

Do you have any fears about falling on the stairs?

- Why?

How much “at risk” of falling are you? Perhaps you could use a percentage scale to describe this, from 100% = very high risk to 0% = zero risk

- Why?

## Changes

In the past 5 years have you had anything done to your stairs to make them safer?

*(eg second hand rail, changed stair carpet, changed wall covering, changed lamp shades, put in brighter light bulbs etc...)*

- Why?

In the past 5 years have you made any changes to the way you use your stairs so that you feel safer when you use them?

*(eg make a point of using the handrail, clean the stairs differently, careful not to hurry while on the stairs, don't leave objects on the stairs etc...)*

- Why?

As you get older can you anticipate any changes you might make to your stairs?

- What changes would be acceptable to you?
- Consider if older relatives visit, how would you change things for them?

As you get older can you anticipate any changes you might make to the way you use your stairs?

- What changes would be acceptable to you?
- Consider if older relatives visit, how would you do things with them?

Do you know of anybody who has fallen on the stairs?

- Do you know what happened?

Has this person's experience had an effect on how you use the stairs?

- How?

Do you know any other people who you feel may be at risk of falling on the stairs?

- What do you think they might do to reduce their risks?

Would you use any of the following?

**Yes**      **No**

---

Fall alarm (explanation of fall alarm)

Why?

---

Hip protector (show a picture)

Why?

---

Stair lift

Why?

Do you think you might move into a bungalow or a ground floor flat as you get older?

- Why?

## Footwear

Do you have any

- Loose fitting or open backed slippers?
- Sandals?
- Shoes with heels?
- Or any other footwear that may cause you to slip or trip?

Do you wear any of these items when you use the stairs?

## Vision

If you wear glasses do you wear them all the time?

- When don't you wear your glasses?

Do these glasses cause you any problems when you use the stairs?

- Do you have any ways of dealing with these problems?
- Were you warned about possible problems you may encounter using the stairs?

If you have any conditions that affect your vision how does it affect your use of the stairs?

## Alcohol

In the last 7 days how many glasses of wine, sherry, beer or spirits have you drunk?

Wine	<input type="text"/>
Sherry	<input type="text"/>
Beer	<input type="text"/>
Spirits	<input type="text"/>

Other comments

Was the last 7 days a typical week?



If you are taking medications do you avoid having a drink?

- Why?

### **Other issues**

Does using the stairs cause you discomfort in any way?

- If so in what way?

When you visit the homes of friends or relatives and use their stairs do find you have any problems with them?

- Why?

If you live in the house with someone else, do you find that you use the stairs less?

- Does that other person make journeys for you?

Have you seen or received any advice about stair safety from:

**Yes**      **No**

Occupational therapist or physiotherapist

Community Care worker

Poster/leaflet campaigns

TV adverts (not advertising stair lifts)

Other

Please specify other:

.....

What did you think of this advice?

- Was it useful?
- Did it encourage you to do anything

Do you have any pets?

- Do they ever "get under your feet" on the stairs?
- How do you deal with this?

Did you tidy the stair area before I arrived?

- What did you tidy away?

Is there a possibility of returning for a light reading when it is dark? This should take about 5 mins of your time

## Falls on the stairs

Participant No.....

Details of any slips, trips, stumbles or falls that have occurred in the last 12 months. Separate form for each fall.

**We are interested in any slips, trips, stumbles or falls you may have had in your home or the homes of friends or relatives, where either you hurt yourself or you might have hurt yourself.**

*(eg misstep top or bottom of the flight, tripping over a pet, foot not properly on the step etc...)*

In whose home did the fall happen?

- Own home
- Home of a friend or family member
- Other

Specify other:

.....

Approximately how long ago did it happened?

What time of day did it happen?

- Morning
- Afternoon
- Early evening (before 8pm)
- Late evening / during the night (after 8pm)
- Can not remember

Can you describe what happened?

- Were you going up or down the stairs when you fell?
- Where on the stairs were you, top, middle, bottom?
- What activity were you doing at the time you fell?

*(eg. cleaning stairs, carrying items)*

Was the light on or off at the time you fell?

Were you wearing glasses at the time you fell?

- Do you feel that wearing your glasses contributed to your fall?

If you had any injuries can you describe them?

If necessary, approximately how long after your fall did you seek medical help?  
(eg minutes, hours, days)

How did you treat your injuries?  
(eg GP, hospital A & E dept, treated injuries at home, no treatment needed)

Are you still affected by your injuries?

- In what way are you still affected?

## **Additional information on methods used in ‘physical measurements’ questionnaire**

All taken without footwear.

### **Height and weight**

Height and weight, were taken using a portable Harpenden anthropometer and portable weighing scales (calibrated previously).

### **Length of feet**

Measured using a portable Harpenden anthropometer, from the heel of the foot to the end of the hallux (big toe), on both feet.

### **Grip strength**

Grip strength was measured using Takei grip dynamometer. This was adjusted for each participant and they were asked to carry out a maximal grip a total of four times on each hand, allowing a short rest period between each grip. A mean reading was taken for each hand.

### **Rising from a stool without using hands**

Participants were asked to sit on a stool and then get up without the aid of their arms. The stool was adjusted so that thighs were horizontal, knees were at an angle of 90° and feet positioned approximately shoulder width apart and flat on the floor. Prior to attempting to get up from the stool, participants were asked to rate the difficulty they would experience with this task on a scale ranging from “able to do without difficulty” to “decided not to attempt”. Subsequent to completing the task the researcher provided a rating of the participants performance on the same scale.

### **Visual acuity**

Participants visual acuity was measured using a Baily-Lovie type test letter chart, a modified version of the Snellen test chart used by Optometrists (copy in appendix B). This chart was positioned in a well-lit area 2.5 metres from the participant and participants were asked to read down the letters on the chart without glasses and with glasses, if worn. To allow statistical analysis of the data, the results were recorded in

'logMAR' units, rather than traditional Snellen notation (e.g. 6/6, 20/20). The new unit is the 'logarithm of the Minimum Angle of Resolution' (hence log M.A.R.) and, when a correctly designed chart is used, its advantage is that results can be averaged – unlike Snellen notation.

For descriptive and comparative purposes, the results have been translated into conventional Snellen notation. The results should not be interpreted to mean that the testing distance was 6 meters, but the use of this notation allows comparison with everyday standards –

e.g. 'normal' visual acuity is 6/6, 6/12 can be considered to be 'adequate' for most everyday tasks, while the driving standard is ?

### **Stereopsis**

Visual stereopsis, which is one component of our depth perception process, was assessed using a Frisby stereotest. This test consists of a number of clear perspex plates, each of which has a random pattern printed on it. On each plate, a small part of the pattern is printed on the opposite side of the plate, and is thus at a different distance from the rest of the pattern.

The participants were asked to view the plate squarely with head held still. The plate was also held in a fixed position by the interviewer and the participants were asked to identify the part of the stereotest that appeared to them to be at a different depth. As the pattern has no structure to it, as long as the head and plate are kept still the task can only be accomplished if the participant has stereopsis. Again participants were asked to perform this test without glasses and also with them if they are usually worn.

# Physical measurements

Participant No.....

## Weight - unshod

kg

## Height - unshod

mm (+1500)

mm (+1100)

## Length of foot - unshod

From heel to end of big toe

Right foot:  
mm

Left foot:  
mm

## Grip strength

Adjust grip so second joint of the forefinger is bent at 90°. Participant should stand upright and relax, extend arms downward, grip the instrument and exert full force without letting their arms touch their body. Repeat 4 times, then record average.

Right hand:  
kgf

Left hand:  
kgf

**Rise from stool without using hands - unshod**

Participant should sit on the stool so that their feet are flat on the floor and their hips and knees are at 90°

How well do you think you will do at this test?

- Able to do without difficulty
- Able to do, but will experience some difficulty
- Able to do, but will experience a lot of difficulty
- Unable to do
- Don't know

Actually did

- Able to do without difficulty
- Able to do, but experienced some difficulty
- Able to do, but experienced a lot of difficulty
- Attempted but unable to do
- Decided not to attempt

Other comments



# Vision Tests

## Distance vision

Place Snellen chart 2.5 metres away from the participant in a well-lit area. Participant to read letters with **glasses off**. Count the number of letters correctly identified for each line of the chart

Worst eye:	Best eye	Both eyes
1:	1:	1:
2:	2:	2:
3:	3:	3:
4:	4:	4:
5:	5:	5:
6:	6:	6:
7:	7:	7:

Repeat test with **glasses on**

Worst eye:	Best eye	Both eyes
1:	1:	1:
2:	2:	2:
3:	3:	3:
4:	4:	4:
5:	5:	5:
6:	6:	6:
7:	7:	7:

## Depth vision

Test with **glasses on**. Place the frisby plate above a plain white background and ask the participant what can they see. The plate should be viewed squarely with head and plate held still

Able to see

Unable to see

Repeat test with **glasses off**

Able to see

Unable to see

**F U H D V**

**U V R H D**

**P F E Z H**

**V N F E U**

**Z U V F P**

**N Z E D R**

**R P N V F**