



## King's Research Portal

DOI:

[10.1111/hsc.12769](https://doi.org/10.1111/hsc.12769)

*Document Version*

Peer reviewed version

[Link to publication record in King's Research Portal](#)

*Citation for published version (APA):*

Willis, R., Channon, A. A., Viana, J., LaValle, M. H., & Hutchinson, A. (2019). Resurrecting the interval of need concept to improve dialogue between researchers, policymakers, and social care practitioners. *Health and Social Care in the Community*, 27(5), 1271-1282. <https://doi.org/10.1111/hsc.12769>

### **Citing this paper**

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

### **General rights**

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

### **Take down policy**

If you believe that this document breaches copyright please contact [librarypure@kcl.ac.uk](mailto:librarypure@kcl.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.

Authors' Accepted Manuscript

**Willis, R., Channon, A.A., Viana, J., La Valle, M.H., and Hutchinson, A. (2019) 'Resurrecting the Interval of Need concept to improve dialogue between researchers, policymakers, and social care practitioners', *Health and Social Care in the Community*, 27(5): 1271-1282.**

DOI: 10.1111/hsc.12769

Date Accepted 12/4/2019

**Authors:**

**Rosalind Willis, PhD** (corresponding author)

Centre for Research on Ageing, Social Sciences, University of Southampton, Southampton, SO17 1BJ, UK

[r.m.willis@soton.ac.uk](mailto:r.m.willis@soton.ac.uk)

Tel: +44(0)23 8059 5367

<https://orcid.org/0000-0001-6687-5799>

**Andrew Amos Channon, PhD**

Department of Social Statistics and Demography, University of Southampton, Southampton, SO17 1BJ, UK

[a.r.channon@soton.ac.uk](mailto:a.r.channon@soton.ac.uk)

<https://orcid.org/0000-0003-4855-0418>

**Joe Viana, PhD**

1. Health Services Research Centre , Akershus University Hospital, Sykehusveien 25, Lørenskog, 1478, NORWAY
2. Centre for Connected Care, Oslo University Hospital, Kirkeveien 166, Oslo, 0450, NORWAY

[Joe.Viana@ahus.no](mailto:Joe.Viana@ahus.no)

<https://orcid.org/0000-0001-6018-8242>

**Maria Herica LaValle, Masters**

University of Southampton, Southampton, SO17 1BJ, UK

[Herica.LaValle@soton.ac.uk](mailto:Herica.LaValle@soton.ac.uk)

**Aisha Hutchinson, PhD**

1. Institute of Applied Social Research, University of Bedfordshire, University Square, Luton, LU1 3JU, UK
2. Centre for Social Development in Africa (CSDA), University of Johannesburg, Auckland Park, 2006, South Africa

[aisha.hutchinson@beds.ac.uk](mailto:aisha.hutchinson@beds.ac.uk)

<https://orcid.org/0000-0002-5474-676X>

**Statement of ethical approval**

Ethical approval for secondary data analysis was obtained from the corresponding author's University (Ethics ID 23348).

**Statement of conflict of interest**

None declared.

**Source of funding**

Herica La Valle was supported by the Economic and Social Research Council [grant number ES/J500161/1].

**Acknowledgements**

We acknowledge the original data creators of the English Longitudinal Study of Ageing, the funders, and the UK Data Archive, who bear no responsibility for the further analysis and interpretation of their data.

**Title:**

Resurrecting the Interval of Need concept to improve dialogue between researchers, policymakers, and social care practitioners

**Abstract**

Academics, social care practitioners, and policymakers speak different languages. If academic research is to have an impact on society, it must be understandable and convincing to the end users. We argue that the conceptualisation of social care 'need' is different among these stakeholders, leading to poor communication between them. Academics should use concepts that have more meaning to practitioners. We propose resurrecting a little-used concept from the 1970s, 'interval of need', to help to bridge this gap. The interval of need concept identifies how often people require help, supplementing the usual data about types of tasks where assistance is needed. The history of the concept is described, followed by a test of its usefulness for today's researchers by applying it to data from the English Longitudinal Study of Ageing. An updated version of interval of need is proposed. Validation checks were conducted against mortality data, and through conceptual validation from a social work practitioner. The nature of the dataset limited comparability with previous studies. However, we conclude that the interval of need concept has promising scope to enhance communication of research findings, potentially leading to improved outcomes for service users. This paper strives to mark a turning point in the language and analysis of social care, ensuring that academic investigation in this field is convincing and clear to practitioners and policymakers.

**Keywords**

Social care; need; measurement; older people; communication; interval of need

### **What is known about this topic?**

- Academics and practitioners use different terminologies for similar concepts
- This difference can mean research findings are less useful for social care practitioners
- The concept of interval of need is simple and understandable, but is not embedded in research

### **What this paper adds**

- The interval of need concept can meet the requirements of both academics and practitioners
- A test of interval of need in a national survey shows it is still relevant and valid, but overestimates critical need
- Surveys should include questions about degree of difficulty performing tasks

## Background

Adult Social Services require information on clients' needs for assessment and planning. However, measurements of need used by academics and social care practitioners do not always align; one of the factors inhibiting translation from research to practice. Others include researchers lacking confidence engaging with practitioners, and practitioners' workload preventing them reading research (Froggatt *et al.* 2009, Luff *et al.* 2011, Cook *et al.* 2008). Stakeholders use measures for different purposes; researchers focus on group level, while practitioners use individual level.

Although there is a place for separate measures, we argue that shared measures have benefits. In this paper we propose returning to a little-used concept: 'interval of need' (Isaacs & Neville 1976a). 'Need' refers to a physical or cognitive deficit inhibiting daily activities, which can be enabled with assistance.

A shared measure of need would be beneficial for researchers, practitioners, and policymakers. First, a clear measurement of need indicates prevalence. Prevalence figures are useful for planning to meet these needs, e.g. the projected increase in dementia prevalence prompted England's National Dementia Strategy (Department of Health 2009) and an increase in research funding (Department of Health 2015, Her Majesty's Treasury 2015). Second, prevalence figures can be used to monitor inequalities, e.g. age discrimination in access to mental health services (Centre for Policy on Ageing 2009). Third, understanding need creates hypotheses about causes, leading to prevention (e.g. Windle *et al.* 2011). Finally, measurements allow evaluations of the success of policies and interventions (e.g. Banerjee *et al.* 2007).

One of the most common ways researchers measure support needs is through Activities of Daily Living (ADL) or Instrumental Activities of Daily Living (IADL) scales (e.g. Katz *et al.* 1963, Bucks *et al.* 1996). Although social care practitioners know of ADL terminology, the scales are not linked to their

formal assessments of need. This leads to tension between the language of researchers and practitioners.

ADL scales measure difficulties and the degree of difficulty. A seminal ADL scale (Katz *et al.* 1963) includes six activities (bathing, dressing, continence, transfer, feeding, toileting); and for each there are four possible answers: receives no assistance; receives some assistance; receives a lot of assistance; or the need is not met at all. However, there is no measure of time, so it is not known how often assistance is required. Knowing how often and for how long a person needs help is important for practice and policy, and is the foundation for benefit calculations such as Disability Living Allowance (DLA) and Personal Independence Payments (PIP) (Her Majesty's Government 2018). Another influential scale is Townsend's (1979), with nine activities (washing, removing a jug from an overhead shelf, tying a knot, cutting toenails, using stairs, running for a bus, shopping, housework, preparing a hot meal) where participants say whether they could do the task with no difficulty, with some difficulty, or they could not do the task at all. There is some time sensitivity; participants are asked whether their ability to do the tasks varied at different times of the year, or on a daily basis. More recently, disease-specific scales have been created, e.g. the Bristol ADL scale for dementia (Bucks *et al.* 1996). There are 20 activities; for each task there are five options denoting the person with dementia's level of ability, and the scale is filled in by a caregiver. There is some time sensitivity as carers should consider the person's abilities over the last two weeks. These, or similar ADL scales, are routinely used to assess need in academic research. Although consideration of time is sometimes included, one aspect that is omitted is how often help is required with each activity. The frequency of help required is vital to be able to plan to meet people's needs.

Turning to Social Services practice in England, the assessment of need is slightly different. Individual assessments are conducted in order to determine the types and intensity of assistance required and to assess eligibility for support. Formerly, Social Services used Fair Access to Care Services (FACS)



eligibility bands to determine whether an individual's needs were critical, substantial, moderate, or low (Social Care Institute for Excellence 2013, Department of Health 2003). According to these guidelines, an individual's needs were assessed as 'critical' if (among other criteria) there was a risk of serious abuse or neglect, life was at risk, or individuals were unable to carry out vital activities. In contrast, a 'low' level of need was assessed if an individual was unable to carry out only one or two activities (among other criteria). The particular personal care activities were not listed; presumably to allow some flexibility in guideline application. After criticism about criteria being applied differently depending on location, the Care Act 2014 (Her Majesty's Government 2014) replaced the FACS bands (Social Care Institute for Excellence 2015). Among the new criteria, an eligible individual is someone who is unable to carry out two or more activities referred to as "outcomes in their day-to-day life" as a result of an illness or impairment (Social Care Institute for Excellence 2015: 2). Furthermore, not being able to carry out those activities must lead to a "significant impact" on wellbeing (Social Care Institute for Excellence 2015: 2). The exact outcomes include nutrition, hygiene, toileting, being clothed, and access to employment or education, among others.

There is conceptual distance between the measurements used by academics and Social Services practitioners. Academics use ADL scales to identify needs, whereas practitioners use outcomes and impacts to assess whether and how often help is required. One measure that has the potential to bridge this gap is interval of need (Isaacs & Neville 1976b).

### **Interval of Need**

The interval of need concept stems from a study conducted in the 1970s (Isaacs & Neville 1976b, Isaacs & Neville 1976a). The Research and Intelligence Unit of the Scottish Home and Health Department requested a new measurement of the needs of older people for residential and domiciliary services. Isaacs and Neville conducted a survey in three areas of the west of Scotland. They defined the idea of 'potential need', i.e. the inability "as a result of physical or mental disease or disability, to perform for themselves all or some of the basic activities of daily living – namely, the

provision of food, warmth, cleanliness, and security” (Isaacs & Neville 1976b: 80). Linked to this is the interval of need, which measures the time elapsed between episodes when the person required help. The interval of need, therefore, is a measure of dependency in terms of the reliance that individuals have on others (Bond & Cabrero 2007). Isaacs and Neville (1976a) categorised participants into those with no needs and those with different grades of frequency of requiring help. They recognised three increasing levels of frequency, i.e.:

- i. ‘long interval need’, when there is an interval of 24 hours or more between two consecutive help episodes required;
- ii. ‘short interval need’, when the interval lasts 3 to 6 hours, that is more than one period every day;
- iii. ‘critical interval need’, which refers to those individuals who need to be helped at very close intervals over the course of a single day, or where needs may arise unpredictably, so they cannot be left alone.

Isaacs and Neville (1976b) created categories based on ADLs and mental capacity. The ADLs included basic activities such as toileting, but also more instrumental activities such as housework and shopping. The latter may not be provided by contemporary Social Services, but in the 1970s they were part of the Home Help Service, which provided assistance with cleaning, groceries, and companionship (Godfrey *et al.* 2000, Social Services Inspectorate 1987, Dexter & Harbert 1983).

Isaacs and Neville found not only a significant relationship between potential need and age of participants, but also this relationship was more pronounced in the highest degree of severity, suggesting that potential need was an age-related phenomenon. This matches with studies of disability prevalence (Banks *et al.* 2014), and therefore acts to validate the concept.

The interval of need concept is advantageous to the previously discussed concepts because it includes the frequency with which help is required. It can therefore be used to determine the support required (useful for planning services), as well as indicate the extent to which needs are met adequately (useful for evaluating services). It could also identify the level of help that is provided by informal carers (such as spouses or children) and would therefore be useful for carers' assessments.

The interval of need concept has been used in a small number of studies (e.g. Bowns *et al.* 1991, Badley *et al.* 1990, Bond & Carstairs 1982, Jagger *et al.* 1989, Challis & Davies 1986), and some of these authors have also utilised the concept in their more recent work, e.g. the Newcastle 85+ cohort study (Jagger *et al.* 2011), the MRC CFAS study (e.g. Jagger *et al.* 2007, Melzer *et al.* 1999), and the PACSim modelling study (Kingston *et al.* 2018). However, given the advantages of the concept, it is surprising that it has not been more widely adopted.

One potential reason for the lack of adoption may be because it can be argued that focusing on difficulties with activities of daily living involves taking an individual perspective, drawing on a deficit model of later life (Künemund & Kolland 2007). The deficit model has been criticised for its tendency to focus on dependence, meaning a focus on need rather than well-being or independence (Fawcett 2014). The deficit model also implies the view of older people as a 'burden' on society. These arguments are valid, and it is important to counter stereotypes around ageing as a social problem. However, it cannot be denied that thousands of older people in England do have functional impairments (Victor 2010) and service provision is still often based on a deficit model, so academics have to engage with these concepts. We argue that the interval of need does not solely represent an individual model of disability; it also includes a social model by allowing an indication of the availability, or lack, of support (whether from the state, private, or family sources). With interval of need, the emphasis moves from an individual's abilities to the degree of support required to help them live independently.

Variations of the interval of need concept have been developed over time, which replicate the age dimension found in the original study, and also show that women have a greater percentage of critical need than men (Bond & Carstairs 1982, Bowns *et al.* 1991, Jagger *et al.* 1989). Jagger *et al.* (1989) used the interval of need concept to investigate physical and mental decline among older people in Leicestershire. They found that, by considering cognitive impairment, physical disability, and incontinence, the condition of 23% of respondents deteriorated into critical interval need over five years. Moreover, 75% of respondents belonging to the critical interval need category during the first interview maintained the same conditions over the five year period. Later, Jagger *et al.* (2011) used the interval of need concept to measure dependency levels in the Newcastle 85+ study. They found that the higher the dependency, the lower the respective percentage of respondents: 41% were independent; 39% were long interval; 12% were short interval; and 8% were critical interval. Furthermore, the interval of time between women's needs was shorter than that of men, indicating a greater degree of dependency among women. The more recent PACSim study applied the interval of need measure to the English Longitudinal Study of Ageing (ELSA), Understanding Society, and the Cognitive Functioning and Ageing Study II (Kingston *et al.* 2018). Their focus was on future projections of care need. Consistent across the projections, including baseline, was that the largest proportion of older people was in the independent category, followed by low dependency (long interval), then high dependency (critical interval), with medium dependency (short interval) the least frequent. The deviation from previous studies may be an underestimation of the short interval category, or alternatively indicate compression of morbidity.

The variables used within the Isaacs and Neville (1976) and Jagger *et al.* (2011) studies to identify need are shown in Table 1.

<Insert Table 1 about here>

Taken together, these studies using interval of need demonstrate that the concept has validity because the age and sex patterns match prevalence figures on disability. It is also useful for identifying how often people require help, supplementing the usual data about types of tasks where assistance is needed.

### *Aim*

Although the interval of need concept has been championed by some authors, it still has not been used widely by academics. Furthermore, at the time of analysis the interval of need concept had not yet been applied to one of the most useful British secondary data sources for Gerontologists: ELSA, although recently published data did use Wave 5 of ELSA (Kingston *et al.* 2018). ELSA has a large, representative sample of older people, and ADL variables. The aim of this paper is to explore how well the interval of need concept can be applied to ELSA, and to critically discuss the added value of doing so.

### **Methodology**

The ELSA dataset was designed to provide data about older adults in England (Marmot *et al.* 2014). The sample originally selected for Wave 1 in 2002/3 was drawn from households that had responded to the Health Survey for England in 1998, 1999, and 2001, with eligible individuals born before 1<sup>st</sup> March, 1952 (i.e. over 50 years of age at wave 1). This original sample was re-contacted in subsequent waves, supplemented by additional individuals. Partners were also interviewed. Interviews with individuals who moved into institutional care were conducted where possible. Full details of the survey can be found on the ELSA website (<http://www.elsa-project.ac.uk/>).

For this study the sixth wave (2012/13) was used for the analysis, with the first wave used as a validity check. Wave 6 was chosen as it was the latest wave available at the time of analysis. The core members (those selected into the sample directly) were analysed, consisting of 9,169

individuals. This comprises 44% males and 56% females, where 32% of men and 37% of women had a limiting long-standing illness (Banks *et al.* 2014). This compares with the general population in England aged 50+ in the 2011 Census, where 47% were male, 53% were female; but overestimates disability as 24% in the Census had a limiting long-term illness or disability (Office for National Statistics 2013).

Respondents were asked about demographic information, health and social participation, work and pensions, income and assets, housing and consumption, cognitive function, expectations of the future, and about volunteering and caring. Within the health module the individual was asked about their mobility and ability to conduct activities of daily living. They highlighted if there were any difficulties doing the activities (for mobility questions) or difficulty because of a physical, mental, emotional or memory problem (for ADL questions). It is important to note that the questions were related to 'difficulty with' an activity, rather than whether they could or could not conduct the activity. There may be different interpretations of this. Another indication of the mobility of the individual was obtained during the timed walk. Individuals aged over 60 were asked whether they could walk a short distance comfortably. Those that could not walk a short distance, even when using a walking aid, were recorded as having severe mobility issues.

Cognitive function was measured using three different tests in Wave 6: orientation in time, word list recall, and fluid intelligence. There are no agreed thresholds for indicating impaired cognitive function within the literature for these specific tests and therefore these were chosen after discussion and initial distributions of scores were examined. Full sensitivity analyses of these thresholds and the construction of the cognitive impairment indicator were undertaken, with minimal (i.e. <1.5%) changes to the percentages classified within each interval of need observed. For the orientation in time, the total score (out of four) was calculated, with a score of zero representing a lack of knowledge of the day, date, month, or year. The word list consisted of 10 items, and the total number of words remembered both immediately and after a delay were summed. For fluid

intelligence individuals were asked to fill in gaps in a number series, with further questions asked dependent on the answers given. Cognitive impairment was identified if the respondent scored poorly on two out of the three tests. We considered a poor score as being zero on the orientation in time test, less than five on the word list recall test, and zero or one on the fluid intelligence test.

### *Classification of the Interval of Need*

Three different classifications of the interval of need were estimated:

1. The **original** conceptualisation of the interval of need, given by Isaacs and Neville (1976b), was mapped onto the information collected within ELSA.
2. An **updated** classification, given by Jagger *et al.* (2011) was calculated.
3. A **new** categorisation was created, addressing limitations of the previous two versions.

Both the Isaacs and Neville and the Jagger *et al.* classifications have four categories of need: independent, long, short, and critical. For the new categorisation five categories were created, with 'very long' need added. The addition reflected activities included in the original definition of long interval (e.g. shopping, gardening) and would have come under the remit of the Home Help Service. However, today these supports would not usually be provided by Social Services and would not be included in a standard needs assessment. The definition of each of these categories is given in Table 2.

*<Insert Table 2 about here>*

The operationalisation of interval of need was dependent on the variables available in ELSA. The new classification was developed in consultation within the research team, one of whom is a social worker (senior practitioner and academic) who has over seven years of care management experience, and was specifically included in the research team for the purpose of concept validation. Each of the items in ELSA were discussed in relation to the type, length, and frequency of support that people typically need if they are having difficulties. Not all of the elements of the original and

updated classifications were available, so these were adapted after discussion, but attempts were made to match the original definitions as closely as possible. The variables that are used are shown in Table 3.

*<Insert Table 3 about here>*

Some adaptations include the item about difficulty making a 'hot meal' in ELSA, whereas the comparable item in the original study was making a 'light meal' (Isaacs & Neville 1976b). However, being unable to prepare a light meal indicates greater impairment than being unable to cook a hot meal. Second, how the respondent interprets 'making a hot meal' could differ. One person might microwave a ready meal, whereas another might make dinner from scratch.

A further complication of the ELSA measurement of ADLs is that it doesn't measure fluctuating needs. That is, it doesn't identify whether some needs are more severe in the morning than the evening (e.g. a person needs help to get out of bed in the morning when they are stiff from a night's sleep, but is able to get into bed in the evening quite easily after a day of moving about). Therefore, the new measurement could potentially make erroneous assumptions that a person requires the same level of help regardless of the time of day.

Missing data on most of the indicators was minimal, with less than 0.1% missing. The largest amount of missing data was seen for cognitive impairment, where about 4% of the respondents did not complete the tests and their responses were given by proxy. If these individuals were reported as having any other critical need then they were included in the analysis. A sensitivity analysis to assess the influence of including proxy respondents was conducted; this indicated that their inclusion did not alter the results (sensitivity analysis available on request).

For this exploratory research percentages of individuals within each category of need were calculated for each of the classifications described above. Cross-sectional sampling weights were



used to correct for the differential chances of selection into the sample. Analysis was conducted using Stata 14.1 (StataCorp 2015).

## **Results**

### *Isaacs and Neville – Original Classification*

On calculating the original classification of the interval of need in ELSA many individuals were placed in the critical need category due to their difficulty in getting up from a chair after sitting long periods. This is likely to be due to the different questions, with the original stating whether the individual was unable safely and without help or supervision to rise from a chair, in comparison to ‘difficulty’ in ELSA. Thus two formulations of the original classification were calculated, with the results shown in Table 4.

### *Jagger – Updated Classification*

Similarly, getting up from a chair was seen to be placing many individuals into the critical need category, and so this classification was calculated twice, including and excluding difficulty with getting up from a chair. Results are shown in Table 4.

Both original and updated conceptualisations of the interval of need appear to overestimate the critical need category compared to the respective papers. For the original definition, almost a third are in critical need, and almost a fifth are still in this category when getting up from a chair is removed. For the updated definition, the percentage is 27.3% in critical need, while this falls to 8.1% once the chair indicator is removed. There is a clear relationship with age for all classifications, with older adults more likely to need any type of care, while more males than females are reported to not need any care at all. This may be due to the ‘healthy survivor’ effect, where men who have survived to older ages are in better health. It may also be due to differential reporting between sexes.

*<Insert Table 4 about here>*

In comparison with Jagger *et al.* (2011) (those aged 85+), more individuals are classified as being in critical need using the ELSA data (those aged 50+). In their study 41% of individuals were independent, 39% with long interval, 12% with short interval category and only 8% with critical need. This indicates that the strict translation of the interval of need to ELSA following the Jagger *et al.* (2011) definition does not identify critical need accurately enough.

#### *New Classification of the Interval of Need*

The results for the new classification of the interval of need are shown in Table 5. This shows 2.6% of individuals with critical need, with a further 9.1% in the short interval of need. The percentages in the long and very long categories taken together (as in the original and updated classifications) is 15.4%, with a slight majority in the long group. There is a large variation by age, with almost 84% of those aged 50-59 independent, in comparison to only one in five individuals in the oldest age group (90+).

*<Insert Table 5 about here>*

The results by age and sex are shown in Figure 1. There is a monotonic increase in the need for help as age increases, with females always having a higher requirement for help than males at each age.

*<Insert Figure 1 about here>*

#### *Validation of the New Classification*

The first stage in the validity check was the involvement of the social worker in the research team, who confirmed that the categorisation was meaningful from a practitioner perspective. A final exploration of the validity of the interval of need concept relates to mortality. Those who participate in ELSA are tracked, with mortality linked from Office for National Statistics records. In order to assess if interval of need is related to mortality, the classification was applied to wave 1 of ELSA.

Information about bowel incontinence and difficulty perceiving danger was not asked, and there was no time element relating to urinary incontinence. These variables are all within the critical interval of need. Therefore the categorisation of interval of need for Wave 1 is likely to incorrectly specify the critical group.

Table 6 shows the percentage of individuals by age and interval of need classification at wave 1 who had died by February 2012. There is a relationship between interval of need and mortality at most ages, with the independent the least likely to die in all ages apart from the 80 to 89 age group. This implies that interval of need is a useful predictor of mortality, which further validates the theoretical basis of the measure.

*<Insert Table 6 about here>*

## **Discussion**

This paper has attempted to apply a classic measurement to a modern dataset for two reasons: (i) to see if the concept can be operationalised using the ELSA variables , and (ii) to see if the concept has benefits over the way researchers usually report need. The analysis revealed difficulties in applying interval of need to ELSA, but there are nonetheless several advantages. The interval of need concept is a useful addition to the toolkit of researchers. It is intuitively better than reporting ADLs/IADLs alone, and it has been validated against the population figures for disability by age and sex, against mortality rates, and by practitioner consultation. Traditional measures of disability give either the overall percentage of people who are disabled (too crude), or the percentage who are unable to do/have difficulty with a certain task (e.g. dressing, or running for a bus). None of those traditional measures indicate how often a person needs help, nor how often a person with a multiplicity of needs requires help. Interval of need does both.

It is helpful to compare with other studies that have used ELSA. Banks and colleagues (Banks *et al.* 2014) using Wave 6 of ELSA, showed that 16% of men and 19% of women had difficulty with one or more ADLs, and 26% of men and 23% of women had difficulty with one or more IADLs. Difficulty increased with age, so the age and gender pattern matches other studies. The pattern also matches the present study's interval of need classification, which further serves to act as validation. Torres *et al.* (2016) used Wave 6 of ELSA and found 21% of the sample had a disability. Interestingly, disability showed a clear pattern with wealth, where disability increased as wealth decreased, and those in the highest wealth bracket were most likely to receive support. Future analysis could explore the relationship between interval of need, support, and wealth, which would help to predict the likely sources of help (informal, Local Authority, privately paid). Another study using ELSA to simulate future projections of disability estimated that years spent in disability will increase over time, indicating expansion of morbidity, and this will be greater for women than for men (Guzman-Castillo *et al.* 2017). What remained unanswered was the frequency with which these people will require support for those disabilities, and the present study offers an opportunity to use survey data to predict that into the future.

The recent PACSim study (Kingston *et al.* 2018) using ELSA, classified most individuals as low (long interval), followed by high (critical interval), and then medium (short interval) dependency. This classification differs from most of the previous studies and the present study, where frequency decreases as severity increases (Jagger *et al.* 2011, Isaacs & Neville 1976b). Reasons for such differences could be our creation of the 'very long interval' category, which includes IADLs like doing work around the house and garden, and because our data refer to people aged 50+, whereas PACSim focused on people aged 65+. Similarly, the Jagger *et al.* study was of people aged 85+ in the North-East of England, while Isaacs & Neville examined people aged 65+ in Scotland.

Only one-third of social care employees have reported having access to academic journals, and only half of those actually used them, many saying that they lacked research skills (Cook *et al.* 2008). One means of overcoming barriers is to find concepts that are understandable to both practitioners and researchers. The interval of need concept can act as a useful means of 'translation' between researchers, working at the population level, and practitioners working at the individual level. Considerable variety in assessment practice has been found in different geographical areas (Challis *et al.* 2010), and a common 'language' about need would improve the situation. Although practitioners may be unfamiliar with the interval of need concept, we argue that the concept may be more intuitively understandable than the measures researchers typically use (e.g. ADLs at the population level). Practitioners need to take account of different aspects of the client's perception about the particular activity (Social Care Institute for Excellence 2013). It is not only about whether the client has difficulty carrying out the activity, but also the client's perception about how often that particular need should be met (Social Care Institute for Excellence 2015). This can vary at an individual level. For example, one client may feel they only need a hot meal once a day, another three times a day. The practitioner must balance the preferences of client with the risks (e.g. nutrition, hygiene, or safety) and also with the costs. Practitioners would then have to negotiate with the client how often the need can be met, and liaise with the funder. Having said that, the client's level of difficulty carrying out activities is the starting point for these negotiations, so interval of need has a useful role for practitioners. In addition, the interval of need concept can benefit policymakers because it is potentially a better way to identify unmet need (e.g. through comparing potential need with help provided) than before, and it can be used to identify pockets of need (e.g. geographical regions). It can also monitor how need changes following policy interventions, e.g. to analyse the impact of the PIP policy and whether and how these payments are enabling care needs to be met.

A limitation of the present study is that the ELSA ADL variables are about difficulty doing activities (yes/no), rather than being unable to do the activities without help. This distinction implies that a person reporting difficulty getting in and out of bed may be able to do it without assistance, but it just takes them longer. Therefore, in ELSA they would appear to have a short interval need, but in the Newcastle 85+ study they might be classed as independent (Jagger *et al.* 2011). This distinction is responsible for the difference in the findings compared to the previous literature (e.g. Isaacs & Neville 1976b). Furthermore, the ELSA variables do not take into account whether a respondent uses aids (such as support rails) to achieve the activities. Therefore, a person who has difficulty using the toilet without a frame might respond 'yes', because the question did not ask them whether they could do the activity with the help of aids. Measurement of ADLs should include degrees of difficulty with a task, and include whether a person is able to do a task with the use of aids or another person, the latter being extremely important for care assessments. A further limitation is the extent to which the ELSA sample incorporated people with cognitive impairment, so the percentage of those who are classified as having a cognitive impairment is likely to be an underestimate. It is also important to note that ELSA is a household survey, although it does include some individuals who have subsequently moved into institutional care. Therefore, these results are not representative of the care needs of all older adults. As a result the percentages of those in each care need category are likely to be an underestimate.

Future research could build on this study in a number of ways. First, external validation of the concept could be conducted with older people, and with greater numbers of social care practitioners. Another area could include linking interval of need to care receipt, e.g. by comparing formal with informal sources. This would enable an evaluation of how well services are meeting the needs of clients. In addition, the other concepts from Isaacs and Neville's (1976b) original paper may also bear investigating, i.e. potential help, and met and unmet need. Finally, the dialogue between

researchers, policymakers, and practitioners that we hope to foster with this article can be continued through this journal and other media.

## **Conclusions**

The Care Act (2014) conceptualises needs in terms of outcomes (e.g. hygiene, toileting, education) and the impacts that not meeting those outcomes would have on an individual's daily life. Such a conceptualisation does not explicitly translate to frequency of support provision required. The advantage of the interval of need concept is that it not only identifies areas that require support, but also the frequency with which support is required. Future care policies could enhance needs assessment with the interval of need concept, to incorporate frequency of need. Furthermore, interval of need can be used to trace the impact of policies by evaluating change over time. Finally, interval of need can be applied to future projections of disability, wealth, and social support, to estimate the sources of support required for the future ageing population.

## References

- Badley, E. M., Tennant, A. & Wood, P. H. N. (1990) The assessment of physical independence handicap: Experience in a community disablement survey. *International Disability Studies*, **12** (2), 47-53. doi:10.3109/03790799009166250
- Banerjee, S., Willis, R., Matthews, D., Contell, F., Chan, J. & Murray, J. (2007) Improving the quality of care for mild to moderate dementia: An evaluation of the Croydon Memory Service Model. *International Journal of Geriatric Psychiatry*, **22** (8), 782-788. doi:10.1002/gps.1741
- Banks, J., Nazroo, J. & Steptoe, A. (Eds.) (2014) *The Dynamics of Ageing: Evidence from the English Longitudinal Study of Ageing 2002-2012 (Wave 6)*, The Institute for Fiscal Studies, London.
- Bond, J. & Cabrero, G. R. (2007) Health and dependency in later life. IN J. Bond, S. Peace, F. Dittman-Kohli & G. Westerhof (Eds.) *Ageing in Society: European Perspectives on Gerontology*. Sage, London.
- Bond, J. & Carstairs, V. (1982) *Services for the Elderly. Scottish Health Service Studies no. 42*. Scottish Home and Health Department, Edinburgh.
- Bowns, I., Challis, D. & Tong, M. S. (1991) Case finding in elderly people: Validation of a postal questionnaire. *British Journal of General Practice*, **41** (344), 100-104.
- Bucks, R. S., Ashworth, D. L., Wilcock, G. K. & Siegfried, K. (1996) Assessment of activities of daily living in dementia: Development of the Bristol activities of daily living scale. *Age and Ageing*, **25** 113-120. <https://doi.org/10.1093/ageing/25.2.113>
- Centre for Policy on Ageing (2009) Ageism and age discrimination in mental health care in the United Kingdom: A review from the literature. Centre for Policy on Ageing, London.
- Challis, D., Abendstern, M., Clarkson, P., Hughes, J. & Sutcliffe, C. (2010) Comprehensive assessment of older people with complex care needs: The multi-disciplinarity of the Single Assessment Process in England. *Ageing & Society*, **30** (7), 1115-1134. doi: 10.1017/S0144686X10000395
- Challis, D. & Davies, B. (1986) *Case Management in Community Care: An Evaluated Experiment in the Home Care of the Elderly*. Gower, Aldershot.
- Cook, J., Bacigalupo, R., Halladay, L. & Norwood, H. (2008) Research use and support needs, and research activity in social care: A cross-sectional survey in two councils with social services responsibilities in the UK. *Health and Social Care in the Community*, **16** (5), 538-547. doi: 10.1111/j.1365-2524.2008.00776.x
- Department of Health (2003) Fair Access to Care Services: Guidance on eligibility criteria for adult social care. IN Department of Health (Ed.) The Stationery Office, London.
- Department of Health (2009) Living well with dementia: A national dementia strategy. Department of Health, London.
- Department of Health (2015) Prime Minister's Challenge on Dementia 2020. Department of Health, London.
- Dexter, M. & Harbert, W. (1983) *The Home Help Service*. Tavistock, London.
- Fawcett, B. (2014) Well-Being and Older People: The Place of Day Clubs in Reconceptualising Participation and Challenging Deficit. *British Journal of Social Work*, **44** (4), 831-848. doi:10.1093/bjsw/bcs145
- Froggatt, K., Davies, S. & Meyer, J. (Eds.) (2009) *Understanding Care Homes: A Research and Development Perspective*, Jessica-Kingsley Publishers, London.
- Godfrey, M., Randall, T., Long, A. & Grant, M. (2000) Review of Effectiveness and Outcomes: Home Care. Centre for Evidence-Based Social Services, Exeter.
- Guzman-Castillo, M., Ahmadi-Abhari, S., Bandosz, P., et al. (2017) Forecasted trends in disability and life expectancy in England and Wales up to 2025: A modelling study. *Lancet Public Health*, **2** (July), e307-e313. [http://dx.doi.org/10.1016/S2468-2667\(17\)30091-9](http://dx.doi.org/10.1016/S2468-2667(17)30091-9)
- Her Majesty's Government (2014) *Care Act 2014*. The Stationery Office, London.
- Her Majesty's Government (2018) Benefits calculators. Gov.uk, London.



- Her Majesty's Treasury (2015) Spending Review and Autumn Statement 2015. CM 9162. IN Treasury (Ed.) The Stationery Office, London.
- Isaacs, B. & Neville, Y. (1976a) *The Measurement of Need in Old People. Scottish Health Service Studies no. 34.* Scottish Home and Health Department, Edinburgh.
- Isaacs, B. & Neville, Y. (1976b) The needs of old people: The 'interval' as a method of measurement. *British Journal of Preventive and Social Medicine*, **30** (2), 79-85.  
<https://doi.org/10.1136/jech.30.2.79>
- Jagger, C., Clarke, M. & Cook, A. J. (1989) Mental and physical health of elderly people: Five-year follow-up of a total population. *Age and Ageing*, **18** (2), 77-82.
- Jagger, C., Collerton, J. C., Davies, K., *et al.* (2011) Capability and dependency in the Newcastle 85+ cohort study. Projections of future care needs. *Bmc Geriatrics*, **11** 21.
- Jagger, C., Matthews, R. J., Matthews, F. E., *et al.* (2007) Cohort differences in disease and disability in the young-old: Findings from the MRC Cognitive Function and Ageing Study (MRC-CFAS). *BMC Public Health*, **7** (156), 1-8. doi:10.1186/1471-2458-7-156
- Katz, S., Ford, A. B., Moskowitz, R. W., Jackson, B. A. & Jaffe, M. W. (1963) Studies of illness in the aged. The index of ADL: A standardized measure of biological and psychosocial function. *Journal of the American Medical Association*, **185** (12), 914-919.  
<https://doi.org/10.1001/jama.1963.03060120024016>
- Kingston, A., Comas-Herrera, A., Jagger, C. & MODEM project (2018) Forecasting the care needs of the older population in England over the next 20 years: estimates from the Population Ageing and Care Simulation (PACSim) modelling study. *Lancet Public Health*, **3** e447-455.  
[http://dx.doi.org/10.1016/S2468-2667\(18\)30118-X](http://dx.doi.org/10.1016/S2468-2667(18)30118-X)
- Künemund, H. & Kolland, F. (2007) Work and retirement. IN J. Bond, S. Peace, F. Dittman-Kohli & G. Westerhof (Eds.) *Ageing in Society: European Perspectives on Gerontology*. 3rd ed. Sage, London.
- Luff, R., Ferreira, Z. & Meyer, J. (2011) Care Homes: Methods Review 8. NIHR School for Social Care Research, London.
- Marmot, M., Oldfield, Z., Clemens, S., *et al.* (2014) English Longitudinal Study of Ageing: Waves 0-6, 1998-2013 [computer file]. 21st Edition ed. UK Data Archive, Colchester, Essex.
- Melzer, D., McWilliams, B., Brayne, C., Johnson, T. & Bond, J. (1999) Profile of disability in elderly people: Estimates from a longitudinal population study. *British Medical Journal*, **318** (24 April), 1108-1111. <https://doi.org/10.1136/bmj.318.7191.1108>
- Office for National Statistics (2013) DC3302EW - Long term health problem or disability by health by sex by age. Nomis/Office for National Statistics, University of Durham.
- Social Care Institute for Excellence (2013) Fair Access to Care Services (FACS): Prioritising Eligibility for Care and Support. Guide 33. Social Care Institute for Excellence, London.
- Social Care Institute for Excellence (2015) Eligibility Determination for the Care Act 2014. Social Care Institute for Excellence, London.
- Social Services Inspectorate (1987) From Home Help to Home Care: An Analysis of Policy, Resourcing and Service Management. Social Services Inspectorate, Department of Health and Social Security, London.
- StataCorp (2015) Stata Statistical Software: Release 14. StataCorp LP, College Station, TX.
- Torres, J. L., Lima-Costa, M. F., Marmot, M. & de Oliveira, C. (2016) Wealth and disability in later life: The English Longitudinal Study of Ageing (ELSA). *PLoS One*, **11** (e0166825), 1-12.  
doi:10.1371/journal.pone.0166825
- Townsend, P. (1979) *Poverty in the United Kingdom*. Pelican, Harmondsworth.
- Victor, C. R. (2010) *Ageing, Health and Care*. Policy Press, Bristol.
- Windle, K., Francis, J. & Coomber, C. (2011) Preventing loneliness and social isolation: Interventions and outcomes. SCIE Research Briefing 39. Social Care Institute for Excellence, London.

**Table 1: Original definitions of Interval of Need from Isaacs and Neville (1976) and Jagger *et al.* (2011)**

Category	Isaacs and Neville (1976)	Jagger <i>et al.</i> (2011)
Independent	Those without need	Supervision or help for any activity was not essential
Long	<p>Individuals were able to:</p> <ul style="list-style-type: none"> <li>- walk indoors</li> <li>- use the W.C.</li> <li>- boil a kettle</li> <li>- prepare a light meal,</li> </ul> <p>But who could not do:</p> <ul style="list-style-type: none"> <li>- domestic work</li> <li>- go out to the shops</li> </ul>	<p>Unable to perform, without help, any of:</p> <ul style="list-style-type: none"> <li>- washing all over,</li> <li>- shopping for groceries,</li> <li>- light housework,</li> <li>- heavy housework,</li> <li>- managing money or cutting own toenails.</li> </ul>
Short	<p>Individuals were not capable of providing for themselves a hot meal or drink.</p> <p>However they were able to go to and use the W.C. unassisted.</p>	<p>Unable to perform, without help, any of:</p> <ul style="list-style-type: none"> <li>- getting in and out of bed,</li> <li>- dressing and undressing,</li> <li>- preparing and cooking a hot meal,</li> <li>- taking medication or washing face and hands;</li> </ul>
Critical	<p>Individuals who:</p> <ul style="list-style-type: none"> <li>- were unable safely and without help or supervision to rise from bed or chair</li> <li>- walk to the W.C., use it and return. Their toilet needs might arise at any time by day or night, at short or unpredictable intervals.</li> <li>- They could safely be left alone only for short periods.</li> </ul> <p>Also included in this category were:</p> <ul style="list-style-type: none"> <li>- incontinent subjects, even if they were ambulant;</li> <li>- the severely mentally disturbed who were irresponsible, and who, if unsupervised, might endanger themselves or others</li> <li>- those who were acutely ill and needed constant nursing attention.</li> </ul>	<p>Those who have:</p> <ul style="list-style-type: none"> <li>- a SMMSE score of less than 10, or</li> <li>- severe or profound urinary incontinence with inability to dress or undress without help, or</li> </ul> <p>Unable to perform, without help, any of:</p> <ul style="list-style-type: none"> <li>○ getting on and off the toilet, or</li> <li>○ getting in and out of a chair, or feeding oneself</li> </ul>

**Table 2: Definitions of Interval of Need used in each study**

	<b>Isaacs and Neville (1976)</b>	<b>Jagger <i>et al.</i> (2011)</b>	<b>New Categorisation</b>
Critical	Individuals can safely be left alone only for short periods. If their needs were not met as soon as they occurred a different need was created-for example, if the subject fell or was incontinent the need would then become lifting or cleaning him.	Individuals require 24-hour care since help is required potentially at any time or the individual requires constant supervision.	Individuals require almost constant supervision and help, as need may occur at any time.
Short	Individuals need two, three, or more periods of help every day at intervals of three to six hours.	Individuals require help at regular intervals each day	Individuals require help two or three times a day.
Long	Help is required at intervals of 24 hours or more.	Help is required help less often than daily.	Help is required once daily.
Very long	N/A	N/A	Individuals will need help to perform activities about once or twice a week
Independent	Not defined explicitly, but taken as those not in the above categories.	Supervision or help for any activity is not essential.	Individuals do not have any difficulty in performing common activities.

**Table 3: Operationalisation of Interval of Need as defined by Isaacs and Neville (1976), Jagger *et al.* (2011) and this study for ELSA, wave 6.**

Category	Isaacs and Neville (1976)	Jagger <i>et al.</i> (2011)	New conceptualisation
Independent	Those without any difficulty noted elsewhere	Those without any difficulty noted elsewhere	Those without any difficulty noted elsewhere.
Very Long	N/A	N/A	Those who have difficulty: <ul style="list-style-type: none"> <li>- shopping for groceries</li> <li>- doing work around the house or garden</li> <li>- managing money, such as paying bills and keeping track of expenses</li> <li>- using the telephone</li> <li>- walking 100 yards</li> </ul>
Long	<p>Individuals who have difficulty with:</p> <ul style="list-style-type: none"> <li>- shopping for groceries</li> <li>- doing work around the house or garden</li> </ul> <p>The positive attributes noted in the original definition were not used, as they were either not measured or if the individual could not do them they were included in a higher level of need.</p>	<p>Those who have difficulty:</p> <ul style="list-style-type: none"> <li>- bathing or showering</li> <li>- shopping for groceries</li> <li>- doing work around the house or garden</li> <li>- managing money, such as paying bills and keeping track of expenses</li> </ul> <p>There were no questions in ELSA differentiating between levels of housework or regarding cutting toenails.</p>	<p>Those who have difficulty:</p> <ul style="list-style-type: none"> <li>- bathing or showering</li> <li>- dressing, including putting on shoes and socks</li> <li>- preparing a hot meal</li> </ul>
Short	<p>Individuals who have difficulty with:</p> <ul style="list-style-type: none"> <li>- preparing a hot meal</li> </ul> <p>The ability to use the W.C. was not included as those who could not do this were included in the critical level of need.</p>	<p>Those who have difficulty:</p> <ul style="list-style-type: none"> <li>- getting in and out of bed</li> <li>- dressing, including putting on shoes and socks</li> <li>- preparing a hot meal</li> <li>- taking medication</li> </ul> <p>There was no question about washing face and hands in ELSA.</p>	<p>Those who have difficulty:</p> <ul style="list-style-type: none"> <li>- getting in or out of bed</li> <li>- taking medications</li> <li>- eating, such as cutting up food</li> <li>- using the w.c., including getting up and down (but who were continent)</li> </ul> <p>Also included are those who could not walk alone a short distance.</p>
Critical	<p>Included in this category were</p> <ul style="list-style-type: none"> <li>- Individuals who have difficulty with: <ul style="list-style-type: none"> <li>o getting in and out of bed</li> <li>o difficulty in getting up from a chair after sitting long periods</li> </ul> </li> </ul>	<p>Included in this category were:</p> <ul style="list-style-type: none"> <li>- Those with severe cognitive impairment.</li> <li>- Individuals who were incontinent for more than a month (either urinary or bowel) were included and who had difficulty with</li> </ul>	<p>Included in this category were:</p> <ul style="list-style-type: none"> <li>- individuals who had difficulty recognising that they were in physical danger</li> <li>- those who were incontinent for more than a month (either bowel or urinary) and who had</li> </ul>

- 
- using the toilet, including getting up and down
  - Individuals who were incontinent for more than a month (either urinary or bowel) were included.
  - Those who were classified as having severe cognitive impairments and who had difficulty in recognising when in physical danger were included.

No indication of acute illness and needing constant nursing attention was included in ELSA.

dressing, including putting on shoes and socks.

- Those who had difficulty:
  - using the toilet, including getting up and down
  - in getting up from a chair after sitting long periods
  - eating, such as cutting up food.

difficulty using the w.c., including getting up and down from it.

---

**Table 4: Distribution of Interval of Need for the original and updated classifications, by age and sex**

		Independent	Long	Short	Critical	Count
<b>Original</b>						
Age	50-59	74.0	2.1	0.3	23.6	2,001
	60-69	66.5	2.5	0.5	30.5	3,375
	70-79	57.4	3.4	0.8	38.4	2,402
	80-89	37.5	8.0	2.5	52.1	993
	90+	21.3	9.9	3.5	65.4	206
Sex	Male	70.2	2.7	0.7	26.4	3,961
	Female	57.2	3.8	0.8	38.2	5,016
<i>Overall</i>		<i>63.3</i>	<i>3.3</i>	<i>0.8</i>	<i>32.6</i>	<i>8,977</i>
<b>Original (excluding chair)</b>						
Age	50-59	83.0	4.0	0.7	12.3	2,000
	60-69	76.9	5.8	1.0	16.3	3,365
	70-79	68.7	7.5	1.5	22.3	2,397
	80-89	49.2	12.6	3.7	34.5	986
	90+	26.7	17.9	10.4	45.0	205
Sex	Male	79.6	5.5	1.5	13.4	3,949
	Female	68.0	7.3	1.5	23.3	5,004
<i>Overall</i>		<i>73.5</i>	<i>6.4</i>	<i>1.5</i>	<i>18.6</i>	<i>8,953</i>
<b>Updated</b>						
Age	50-59	75.7	2.1	2.5	19.7	2,000
	60-69	69.6	3.0	2.5	25.0	3,379
	70-79	59.2	4.5	4.5	31.8	2,407
	80-89	38.3	10.3	5.5	46.0	992
	90+	19.4	14.1	11.4	55.0	206
Sex	Male	70.1	3.0	3.8	23.1	3,966

	Female	31.1	4.9	3.1	31.0	5,019
<i>Overall</i>		<i>65.4</i>	<i>4.0</i>	<i>3.4</i>	<i>27.3</i>	<i>8,985</i>
<b>Updated (excluding chair)</b>						
	50-59	83.5	4.0	7.6	4.9	2,000
	60-69	79.4	6.4	8.5	5.8	3,373
Age	70-79	69.9	8.5	11.6	10.0	2,403
	80-89	48.6	17.0	15.7	18.8	989
	90+	24.9	24.6	23.5	27.1	205
	Male	77.6	5.6	10.7	6.1	3,957
Sex	Female	71.9	9.1	9.2	9.9	5,013
<i>Overall</i>		<i>74.6</i>	<i>7.5</i>	<i>9.9</i>	<i>8.1</i>	<i>8,970</i>

**Table 5: Interval of Need by Age and Sex for the New Classification**

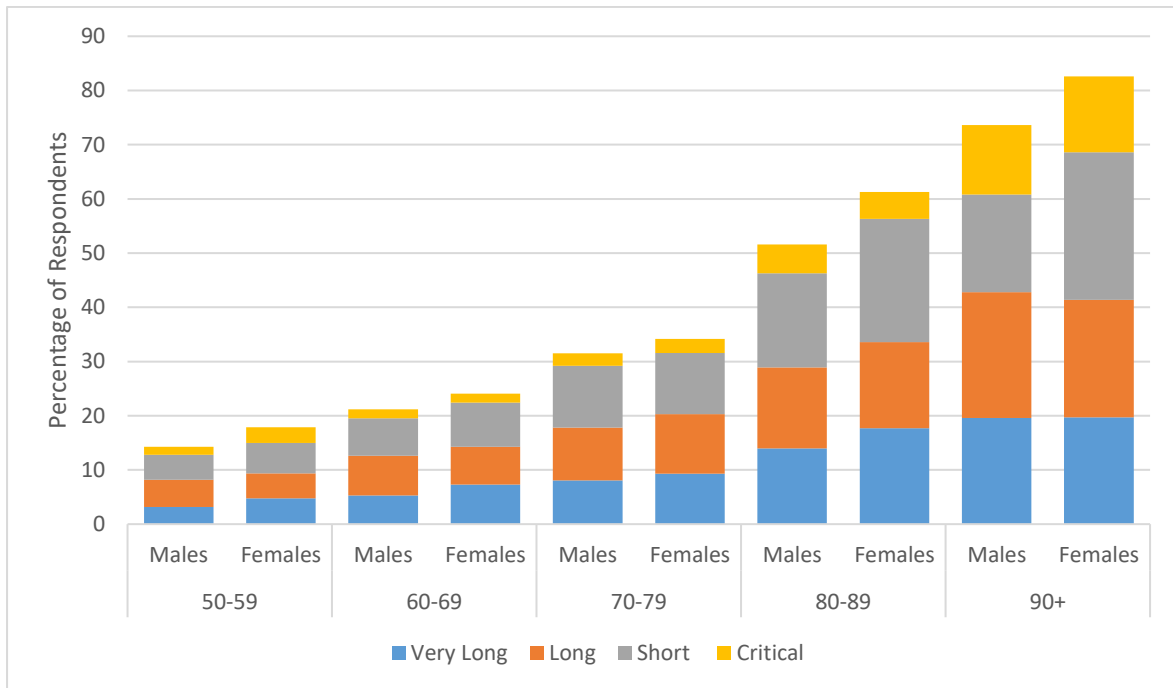
		<b>Independent</b>	<b>Very Long</b>	<b>Long</b>	<b>Short</b>	<b>Critical</b>	<b>Count</b>
Age	50-59	83.9	4.0	4.8	5.1	2.2	2,062
	60-69	77.3	6.4	7.2	7.5	1.7	3,445
	70-79	66.9	8.9	10.4	11.4	2.5	2,441
	80-89	42.8	16.1	15.4	20.5	5.2	1,001
	90+	19.8	19.7	22.1	24.7	13.6	207
Sex	Male	75.9	6.0	7.8	8.0	2.2	4,070
	Female	70.0	8.4	8.4	10.1	3.0	5,086
<i>Overall</i>		72.8	7.3	8.1	9.1	2.6	9,156



**Table 6: Mortality Status after Wave 5 by Interval of Need classification and age at Wave 1**

Interval of Need	Age at Wave 1														
	50-59			60-69			70-79			80-89			Overall		
	Approval*	Died	N	Approval*	Died	N	Approval*	Died	N	Approval*	Died	N	Approval*	Died	N
<b>None</b>	97.7	0.4	2066	97.8	1.1	1370	97.8	6.7	798	100.0	16.3	161	97.8	2.4	4400
<b>Very Long</b>	98.9	3.0	118	96.9	4.1	70	100.0	9.1	90	93.9	15.5	33	98.3	6.3	311
<b>Long</b>	95.3	2.5	145	97.3	3.9	150	99.0	7.2	184	98.0	12.3	57	97.4	5.8	538
<b>Short</b>	96.8	4.5	145	97.4	2.9	135	94.6	16.8	95	100.0	22.6	39	96.8	8.8	415
<b>Critical</b>	100.0	3.3	18	92.3	9.1	28	100.0	0.0	11	100.0	0.0	4	96.5	5.1	62
<b>Total</b>	97.6	0.9	2492	97.6	1.7	1752	97.9	7.7	1179	98.9	16.0	294	97.7	3.4	5726

\* Percentage of individuals in Wave 1 who gave approval for their records to be linked to ONS mortality data



**Figure 1: Interval of need by age and sex for the new classification**

## List of Table Titles

Table 1: Original definitions of Interval of Need from Isaacs and Neville (1976) and Jagger *et al.* (2011)

Table 2: Definitions of Interval of Need used in each study

Table 3: Operationalisation of Interval of Need as defined by Isaacs and Neville (1976), Jagger *et al.* (2011) and this study for ELSA, wave 6.

Table 4: Distribution of Interval of Need for the original and updated classifications, by age and sex

Table 5: Interval of Need by Age and Sex for the New Classification

Table 6: Mortality Status after Wave 5 by Interval of Need classification and age at Wave 1

## List of Figure Titles

Figure 1: Interval of need by age and sex for the new classification