# Enabling and constraining successful reablement: Individual and neighbourhood factors

**Authors**

Christopher Jacobi, University of Oxford. *chris.jacobi@nuffield.ox.ac.uk*

Darren Thiel, University of Essex. *djthiel@essex.ac.uk*

Nick Allum, University of Essex. *nallum@essex.ac.uk*

**Abstract**

Using multilevel logistic regression to analyse management data of reablement episodes collected by Essex County Council, UK, from 2008-2012, this article identifies constraining and enabling factors for successful reablement. Overall, 59.5% of Essex reablement clients were classed as able to care for themselves when assessed after 13 weeks, but several social, health, referral and age-related factors were found to constrain that. However, some of the largest effects found to constrain reablement were neighbourhood deprivation and, particularly, unfavourable geodemographic profiles as measured through Mosaic consumer classifications. The results suggest that in order to optimise reablement, programmes might be better tailored and intensified for particular client groups, particularly for those displaying specific geodemographic characteristics.

**Keywords**

Functional independence; care intervention; ageing population; Mosaic geodemographic classification; Index of Multiple Deprivation.

## 1. Introduction

Generated by changing community structures and aging populations combined with government budget cuts and facilitated by 'empowerment orientated' treatment philosophies that aim to decrease dependence and increase self-sufficiency, short-term restorative health interventions involving physical and occupational therapy, health education and/or assistive technologies, delivered outside of institutional settings and in clients' homes for limited time periods (for up to 6 weeks) have blossomed in health care provision in a number of Western nations, particularly in the UK (UK Department of Health, 2012, Pilkington, 2013, Ryburn et al., 2009). Although the specific content of reablement programmes differs across and within countries, and also in relation to the particular needs of clients, all programmes share the aim to enable and 're-able' frail, sick and disabled people to achieve 'functional independence' i.e. the ability to live a self-reliant life in which vital everyday activities like dressing, washing, eating, toileting and basic mobility are achieved by the client themselves without the need for on-going assistance from homecare providers. Reablement programmes may also forestall client admission to hospitals or other institutional care settings, possibly saving costs (Lewin et al., 2014, Reidy et al., 2013, Ryburn et al., 2009, World Health Organisation, 2004, Glendinning and Newbronner, 2008), and decreasing the probability of loss of functional independence following periods of hospitalisation. However, research evaluating reablement programmes has also demonstrated that substantial proportions of clients do not benefit - despite their exposure to interventions that appear to be effective for others. In this paper, we examine some of the factors that may contribute to the heterogeneity of outcomes, focusing in particular on the association between neighbourhood factors and the geodemographic profiles of reablement clients. To accomplish this, we use management data from an English county council linked to geolocation information that contextualises clients in their local environment.

## 1.1 Reablement programmes

Compared to the provision of on-going homecare, reablement programmes have been shown by a number of studies (almost all of which are based on analyses of reablement for older people) to provide better outcomes for clients in many areas including: improved subjective perceptions of quality of life (Bragstad et al., 2012, Glendinning and Newbronner, 2008, King et al., 2012, Lewin et al., 2013b, Tinetti et al., 2002) and mental health (Markle-Reid et al., 2006); increased independent coping with everyday activities (Gill et al., 2002, Gitlin et al., 2006, Lewin et al., 2014, Tinetti et al., 2002); increased likelihood of remaining living at home rather than admission to hospital or institutional care (Bragstad et al., 2012, Tinetti et al., 2002); and a subsequent decrease in the levels and hours of on-going care provided by professional care workers (Glendinning et al., 2010, Glendinning and Newbronner, 2008, King et al., 2012, Lewin et al., 2013b, Newbronner et al., 2007, Tinetti et al., 2002).

Despite these positive overall results, studies also show that not all clients become more independent following reablement and that some clients tend to benefit more than others. For example, Glendinning and Newbronner's (2008) longitudinal study found that although 58 per cent of reablement clients did not require on-going homecare for up to 12 months following the intervention compared with only five per cent of the control group, this still left a significant proportion of reablement clients needing on-going homecare. The current research evidence, however, is somewhat scant, saying little about the types of clients that benefit most, or least, from such programmes, nor is there much evidence about the socio-economic, neighbourhood or health factors that likely confound or facilitate successful reablement outcomes. As one study put it, we do not yet know: 'which components [of reablement programmes] are most beneficial, which clients are likely to receive the greatest benefit, and [the] appropriate intensity or duration of such interventions' (Ryburn et al., 2009, p. 225, see also Wilde and Glendinning, 2012).

A handful of studies have identified some limited and limiting factors. Newbronner et al. (2007) indicate that clients over 85 years old tend to benefit most from reablement, and Lewin et al.'s (2013a) Randomised Controlled Trial in Australia identified that those experiencing 'severe frailty' did not benefit from reablement intervention any more than those that received no intervention - yet people with mild or moderate frailties and those who lived alone tended to benefit most (see also Gill et al., 2002). In one small qualitative study, Wilde and Glendinning (2012) suggest that reablement was less successful for those with chronic disabilities and progressive conditions and also for those with sensory impairments, specific cultural needs, and, paradoxically in relation to Lewin et al., less effective for those that lived alone - although Wilde and Glendinning's sample was too small to make any reliable generalisations. There are clearly contradictions and gaps in knowledge about which types of clients are likely to benefit or not from reablement, and we demonstrate that understanding the neighbourhood conditions that clients face may provide an answer to some of these contradictions.

### 1.2 Neighbourhoods, health and reablement

Economists, public health researchers and sociologists have for a long time emphasised the importance of neighbourhood conditions in shaping health (Diez-Roux, 1998, Pickett and Pearl, 2001, Bernard et al., 2007, O'Campo et al., 2009, Duran et al., 2013, Plane and Klodawsky, 2013, Jokela, 2015) primarily through neighbourhoods' differing levels of social capital, physical environment, local services and stressors (Kawachi and Berkman, 2003). This may be especially likely for reablement because some of its major goals - like outdoor mobility (e.g. being able to walk in the local environment) - are directly linked to neighbourhood conditions (Hjelle et al., 2017). Reablement success may thus be especially dependent on neighbourhood characteristics given that independent living necessarily requires access to local services like transport, doctors, chemists and shops. It is also likely that informal social

networks embedded in neighbourhoods would be a key factor in supporting patients' recovery. Moreover, as is the case for old people in general (Hjelle et al., 2017), reablement clients probably live in their respective neighbourhoods for long durations and, as they are less physically mobile, are especially vulnerable to local neighbourhood conditions.

Low socio-economic status is also commonly associated with poor health outcomes (Adler and Ostrove, 1999, Feinstein, 1993, Kennedy et al., 1998, Winkleby et al., 1992), and some researchers have made effective use of measures that combine neighbourhood details and socio-economic status with a number of other measures, producing highly significant results (see, for example, Sharma et al., 2010).

In this paper, we use information about neighbourhoods as a predictor of reablement success, to better understand the inconsistencies that we have shown to emerge from previous research. We do this by modelling detailed reablement management data kept by Essex County Council from January 2008 to January 2012, combining this with Mosaic classification data (Experian Limited, 2007). Mosaic is derived from detailed demographic, financial, socio-economic and consumption data, as well as location, property value and property characteristic information. Data is gathered from broad sources including the UK census and council tax bands, and also proprietary datasets pertaining to property valuations, house sale prices, self-reported lifestyle surveys, a survey of adults' consumption of products, brands and media; and intelligence gathered through monitoring internet use (Experian Limited, 2004). Mosaic classifications can be linked with readily available location data (drawn by postcodes) in administrative datasets, which is particularly useful when socio-economic factors have not been directly collected in those datasets. Based on these classifications, our principal research question is:

1. To what extent do neighbourhood-level factors influence the success rate of reablement programmes?

## 2 Data and methods

The data come from Essex County Council (ECC) who monitor reablement programmes that are delivered by a specialist private care company. Clients were referred for reablement through either a stay in hospital or following referral by a care visitor. The management data show that 1,454 (17.9%) clients were referred to reablement from a community context by a care visitor and 6,664 (82.1%) from hospital. Clients' care-needs were assessed by the care company through a Service Measurement Tool (SMT; see Table 3) that assessed clients' scores for mobility and transfers, ability for personal care, home skills, sensory abilities, and health and understanding. Other categories in the assessment included ability for communication, cooperation, management of finances, as well as information about the levels of care currently received. Each measurement was scored on a scale from zero to four. Individual clients were then assigned a reablement package tailored to meet their individual needs as ascertained by interpretation of the SMT.

Although the management data contained no information about the specific content of the reablement programmes delivered, all programmes were ostensibly tailored to individual client need. However, each programme commonly provided interventions in clients' homes for up to six weeks that aimed to teach the skills necessary to carry out everyday living activities in order to live independently or, at least, be less reliant on ongoing professional homecare services. The nature of the monitoring data meant that there was no control or comparison group from which to analyse the overall effectiveness of reablement programmes versus other types of programmes of care in Essex, but the data does show the relative effectiveness of the programmes as measured by the share of clients that were in self-care as opposed to continued care at 13 weeks after the reablement intervention.

The dataset contains 10,724 reablement client cases and represents the entirety of reablement programmes from 2008 to 2012. It thus provides a uniquely rich insight into reablement

programmes. Nonetheless, as is typical with administrative datasets, various checks for plausibility (such as inconsistent or false codings, duplicate cases and outliers) and data management procedures were carried out in Stata 15.1 (StataCorp, College Station, USA). 1,073 cases were dropped due to incomplete information. Additional to this, there were many missing cases on the marital status variable (693), but because marital status and reablement potentially interact, we decided to include this variable in the analyses and created a separate category for the missing cases. Due to data limitations on relevant covariates, we also restricted the analytic sample to people aged 60 to 99. 1,533 repeat cases were excluded because this paper focuses only on first-time reablement episodes. Robustness checks and multiple imputations for variables with missing values were carried out, but they did not appear to change the results in any appreciable way. In total, the final dataset includes 8,118 clients with sufficient information at their first reablement event.

### 2.1 Variables

The outcome variable of our study is self-care 13 weeks after the reablement programme versus those clients that continued to need care, either as residential or homecare or in hospitals. Self-care at 13 weeks had been chosen as the target outcome by the County Council and represented a short to medium term assessment point of the effectiveness of the intervention. Even though patients were also assessed at discharge, and at 26 and 52 weeks, these data points could not be used for further modelling because that data had been measured and coded inconsistently. People who died after the start of the reablement programme and before the assessment at 13 weeks were also excluded from the regression results as it is unlikely that the reablement programmes would have affected this outcome. As such, 7,130 out of the 8,118 cases were still 'live' at 13 weeks and were included in the analyses.

Risk factors were analysed via categorical indicators (see Table 4 for baseline statistics) describing clients' general social characteristics (age, gender and ethnicity), referral route (hospital or community), two categorisations of clients' general levels of disability ('care-need' and 'care condition'), and geodemographic profiles using the Mosaic classification data (15 categories). There were more women than men in the sample, but this reflects the demographics of old age in the UK.

Four marital status categories were selected because the literature frequently states that married or cohabiting people tend to have different health and care outcomes than single people (Robles and Kiecolt-Glaser, 2003, Wood et al., 2007, Johnson et al., 2000), and that cohabitation is likely to aid independence. Yet, these marital status measures were treated with caution as being unmarried, cohabiting or divorced was much more likely for younger people than older people and were thus partly a proxy of age. Despite the relatively small number of the non-white ethnic group (N=262), ethnicity (classified as white British or not) was also selected for analysis.

The coding of general levels of disability ('care condition') used by the County Council contained the following impairments: dementia, frailty, function, sensory, physical disability severe, physical disability appreciable, physical disability mild and temporary illness. In addition, estimated daily social care-need was categorised into groups of 1-3, 4-6, 7-9, 10-12, 13-15 and 16-23 hours. Figure 3 illustrates the distribution of key variables used in this study.

Neighbourhoods were classified via the fine-grained LSOAs, with 846 separate areas in Essex of around 1,500 people each. The LSOAs are designed to represent coherent geographic areas based on factors such as natural boundaries (rivers or roads) or population distributions. In the reablement dataset, on average, 8.4 clients were living in each LSOA (minimum: 1; maximum: 37). To maximise the information provided by the dataset, we employed multilevel logistic

regression models in which reablement clients were nested in LSOAs. The multilevel framework allowed us to capture the amount of shared variance in reablement outcomes at the neighbourhood levels and to control for the correlated standard errors of reablement clients within LSOAs.

The LSOAs were matched with location data pertaining to levels of deprivation as uncovered by the Index of Multiple Deprivation. The IMD, which is scored from 0 (least deprived) to 100 (most deprived), is a composite indicator of income, employment, health deprivation and disability, education skills and training, barriers to housing and services, crime and living environment statistics. The IMD scores of each neighbourhood were double standardised so that a one-unit increase approximates the difference between one of the most to one of the least deprived neighbourhoods. The IMD was used to test if deprivation was associated with reablement outcomes and, while Essex is not a particularly deprived area of the UK overall, it contains some pockets of very highly deprived areas - most saliently seaside towns like Clacton, Harwich and Jaywick – the latter regularly being deemed the most deprived area of the UK. The ranking of the IMDs was calculated based on the IMD scores for all of England, and Geographic Information Systems (GIS) techniques were employed to visualise the results via the user-written Stata command 'maptile' (Stepner, 2017).

Uniquely, we also utilised Mosaic geodemographic classification tools to test reablement success (Table 2). The Mosaic tool analyses vast amounts of information to classify the UK population into 15 geodemographic categories and 69 types based on various demographics, lifestyles, preferences, and socio-economic factors. We had access to Mosaic data at the postcode level of the reablement clients (about 20 properties per postcode) for the year 2010 and employed them as detailed measures of general socio-economic conditions of the reablement clients. Mosaic group B ('Residents of small and mid-sized towns with strong local roots') was chosen as the reference category.

## 3 Results

As seen in Table 1, the overall results reveal that after 13 weeks following the intervention, a total of 59.5 per cent of clients no longer required on-going care. In contrast, 28.4 per cent of clients continued to need care and 12.2 per cent of clients were deceased. When excluding deceased patients, the success rate of the reablement programme is 67.7%, i.e. 4828 out of 7130 clients were in self-care 13 weeks after the reablement programme.

The length of the reablement episodes varied substantially by the outcomes with patients initially in self-care having shorter programmes (32.2 days on average) than people with a continued care demand (41.7 days). This could suggest that clients who achieve self-care have fewer care-needs initially. Similarly, patients with greater care-need appear to have longer reablement episodes. Given the large standard deviations of the lengths of the reablement episodes across all three outcomes, it seems that there is much heterogeneity in actual reablement programmes.

*Table 1 Outcome statistics and length of the programme*

| Reablement outcomes | Outcome statistics | | Length in (days) | |
|---|---|---|---|---|
| at 13 weeks | Count | Col % | Mean | Std. dev. |
| Self-care | 4,828 | 59.5 | 32.2 | 17.5 |
| Care need | 2,302 | 28.4 | 41.7 | 21.3 |
| Deceased | 988 | 12.2 | 25.3 | 19.5 |
| Total | 8,118 | 100.0 | 34.0 | 19.6 |

*Source: ECC reablement dataset 2008-2012.*

Baseline descriptive statistics are shown in Table 4 and Table 5 (appendix). In Table 6 (appendix) and below in Figure 1 we highlight the average marginal effects (AMEs) from three logistic regression models. We present AMEs as they offer a convenient way to summarise the average change in the probability of the outcome (successful reablement) for a one-unit change in each of our covariates estimated over all values of that covariate. Thus, they give an intuitive indication of the size of the effect over the full distribution of the independent variable. Model

1 is the baseline model, model 2 adds the neighbourhood IMD deprivation indicator, and model 3 adds the Mosaic classifications.

### 3.1 Model 1: baseline

In terms of age, compared to the reference group of people 85-89 years old, people slightly younger (80-84) had a four per cent higher chance of reablement; people aged 90-94 a four per cent worse chance; and people in the older age group of 95-99 years a nine per cent worse chance of experiencing self-care at 13 weeks. In contrast to the descriptive statistics, the youngest age group, people aged 60-64, now have an eight per cent higher chance of experiencing self-care, which is likely to result from our control for care condition and care-need.

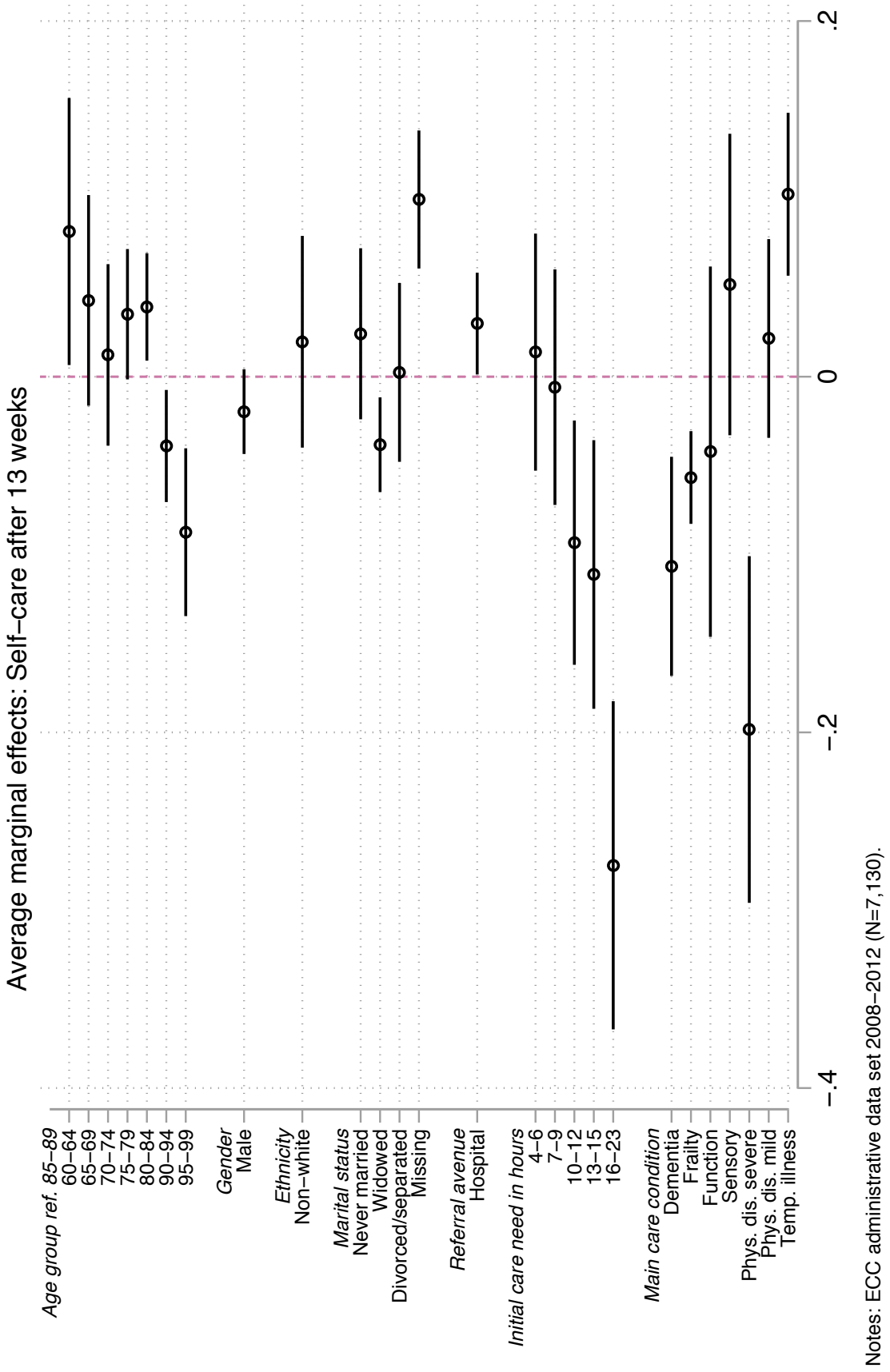
The results imply that very old people have an especially reduced likelihood of self-care. The insignificant effect for the second and, marginally significant effect for third-youngest age groups ($p<0.1$), could stem from the fact there is much heterogeneity at younger ages and that some of them have a very severe care-need. There is no statistically significant effect of ethnicity or gender. People referred from a hospital had a three per cent higher chance of experiencing self-care, though this effect only remained significant at the $p<0.1$ level in model 3. Compared to married reablement clients, those widowed had a four per cent lower chance of self-care. The missing category had a highly positive effect of 10 per cent.

When the amount of initial care-need in hours is higher, the chances of experiencing self-care at 13 weeks are lower. People with 13-15 hours of care-need have an 11 per cent lower chance of self-care, and people in the highest category of 16 or more hours have a 27 per cent reduced likelihood of self-care, which is substantial difference. As seen initially, there is no significant difference from 0 to 9 hours of care-need, possibly because the hours of care-need are a broad measure and do not capture detailed health status. With regards to the main care condition,

arguably the main reason for reablement, we see that people with frailty have a six per cent lower chance of self-care at 13 weeks; those with dementia have an 11 per cent reduced chance of self-care; and those with a severe physical disability have a 20 per cent lower chance of self-care. People whose main condition is classified as a temporary illness have a 10 per cent better chance of self-care. Functional, sensory and mild physical disability have statistically indistinguishable effects from appreciable physical disability (which is the comparison group among all conditions).

The intra-class correlations for models 1-3 reported in Table 8 (appendix) are quite small at 0.02 (confidence interval 0.01 to 0.04). Nonetheless, the Log-Likelihood ratio tests of the multilevel models compared to logistic regression models are highly significant at $p<0.01$ and hence confirm the need to account for the hierarchically nested structure of the data. Other model diagnostics, in terms of the AIC, show improved model fits as the neighbourhood deprivation and Mosaic indicators are added into models 2 and 3.

*Figure 1 Visualisation of average marginal effects (model 1) of self-care after 13 weeks*

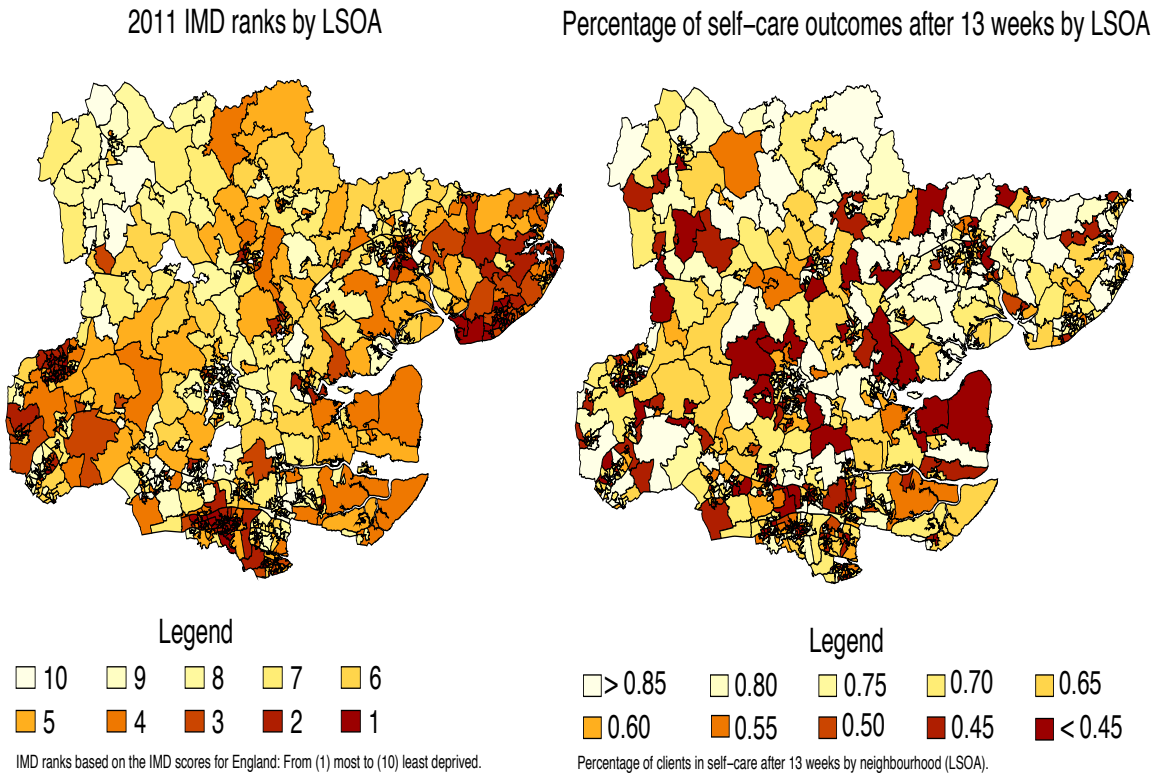


### 3.2 Model 2: IMD

Our results show that neighbourhood deprivation is a significant factor in reducing the likelihood of successful reablement - by 3 per cent - an effect of a similar size as some of the individual-level health predictors. The Log-Likelihood ratio rest of model two versus model one is highly significant (Chi2=5.24, $p<0.02$), suggesting an improved fit to the data. Furthermore, as illustrated below, we observe substantial differences in the neighbourhood reablement success rates (mean 0.59; standard deviation 0.16), with some neighbourhoods having a 100 per cent success rate, and others a zero per cent success rate. The distribution of the neighbourhood reablement success rate is illustrated in Figure 4.

In Figure 2 we present two maps: the first for the IMD scores of the neighbourhoods; the second for the average reablement success rate (ranked in deciles) by the same LSOA neighbourhood boundaries. The latter ranking is not entirely linear, i.e. it starts at 0-45 per cent reablement success rate and then goes up in steps of five per cent up to 85, with the last category from 85-100 per cent. Most neighbourhoods fall in a middle range of a 55-80 per cent success rate. When comparing the two maps, there is not a perfect overlap between the IMD and the neighbourhood reablement success rates. For instance, many of the coastal areas around Jaywick in the north-east of Essex that are extremely deprived have moderately good reablement outcomes. Moreover, the neighbourhood success rate varies more in small clusters while the IMD shows a clear geographic pattern of pockets in the north-east Clacton/Jaywick, south-west (Harlow) and south-west.

*Figure 2 IMD scores and reablement outcomes in Essex*




Together, the results suggest that reablement success rates differ between neighbourhoods. Some of this effect is captured via the IMD, but there is no direct overlap between the most deprived neighbourhoods and the best performing neighbourhoods. Administrative factors could play a role too, such as different reablement implementations between Wards and hospitals. Compared to the IMD where some of the most deprived neighbourhoods are in densely populated areas, many of the neighbourhoods with below-average reablement success appear to be in medium or large areas (suburban/rural).

### 3.3 Model 3: Mosaic

In order to distinguish the broad neighbourhood effects more granularly, we utilised Mosaic geodemographic classifications at the postcode level. A Log-Likelihood ratio test of model three versus two confirms that the Mosaic improves the fit of the multilevel model to the data (Chi2=34.65, $p<0.01$). The names and directions of the effects of the Mosaic groups are

presented in Table 2, and selected qualitative descriptions of key characteristics of the groups and relevant sub-types are offered in-text below. The average marginal effects of the results are visualised in Figure 5.

We find that compared to Mosaic group B ('Strong roots, mixed housing, small town, and tradition' characterised by 'Better off empty nesters in low density estates on town fringes'), clients in group O ('Disadvantaged, low income, long-term illness, low-rise council housing' characterised by 'Older tenants in low rise social housing estates where jobs are scarce') had a 14 per cent lower chance of successful reablement; and clients in group I ('Few qualifications, ethnic diversity, small homes, crowded, below-average incomes' characterised by 'Older town centre terraces with transient, single populations') had an eight per cent lower rate at $p<0.05$.

On the other hand, positive effects are seen for clients in group D ('Significant equity, executives and managers, comfortable, good education, car ownership' characterised by 'Older people living in large houses in mature suburbs') who showed a four per cent increased chance of self-care at 13 weeks. Moreover, group F ('Families, good incomes, comfortable homes, ethical products' characterised by 'Busy executives in townhouses in dormitory settlements') showed a nine per cent increased chance, and group L ('Retired, bought a smaller property, specialist shops, grandchildren') had a five per cent increased chance of successful reablement.

These are strong effects, often with as much or more influence over reablement outcomes as the major care condition predictors. Particular groups of affluent people enjoy significantly better reablement outcomes, and those with less advantaged geodemographic profiles have much worse outcomes. This suggests that factors like poor housing have adverse effects, while better quality housing in comfortable areas with strong social ties have positive ones. Additionally, the strongly negative effect for group O, the most deprived Mosaic group, shows that socio-economic disadvantage is reflected in a very high social care-need. It has been noted

that social care services might also have communication challenges in effectively reaching these groups (Warwickshire Observatory, 2012).

The significant positive effect for group F might stem from clients' proximities to their children, again stressing the importance of supportive social networks (in addition to factors like high incomes and comfortable housing). It is noteworthy that group L has a significant positive effect despite the high age of this group, suggesting that factors like purpose-built housing and functional environments have enabling influences at all ages. In general, high socio-economic groups and people living in comfortable or purpose-built housing experience higher reablement success rates and are thus more self-reliant, while those in low-quality housing and those who are socio-economically disadvantaged tend to experience full reablement success much less frequently.

*Table 2 Mosaic classification groups and effects on self-care after 13 weeks*

| Group | Description | Effect |
|---|---|---|
| A | Residents of isolated rural communities | |
| B | Residents of small and mid-sized town with strong local roots | Ref. |
| C | Wealthy people living in the most sought after neighbourhoods | |
| D | Successful professionals living in suburban or semi-rural homes | + |
| E | Middle-income families living moderate suburban semis | |
| F | Couples with young children in comfortable modern housing | + |
| G | Young, well-educated city dwellers | |
| H | Couples and young singles in small modern starter homes | |
| I | Lower income workers in urban terraces in often diverse areas | - |
| J | Owner-occupiers in older-style housing in ex-industrial areas | |
| K | Residents with sufficient incomes in right-to-buy social housing | (-) |
| L | Active elderly people living in pleasant retirement locations | + |
| M | Elderly people reliant on state support | |
| N | Young people renting flats in high density social housing | |
| O | Families in low-rise social housing with high levels of benefit need | - |

*Note: Mosaic classifications 2010. Empty cells in the effect column are statistically insignificant.*

## 4 Discussion

Our multilevel logistic regression models corroborate findings of some previous studies about the general effectiveness of reablement, which here was relatively high at 59.5 per cent (67.7% when excluding deceased patients), showing, at least quantitatively, that the majority of clients benefited from reablement. Yet numerous client factors were identified as significantly influencing reablement success, albeit to various degrees.

The most influential predictive factors for negative reablement outcomes were related to previous care-needs where having very high hours of initial care-need, a very high age, and severe physical disability, dementia or frailty significantly mitigated the success of reablement. This confirms previous research that very high health need is likely to have a negative effect on reablement success (Gill et al., 2002, Lewin et al., 2013a, Reidy et al., 2013). Similarly, our finding that people older than 90 were less likely to benefit from reablement is probably also the result of poor health and the natural limits on health improvements at an older age. This is not to say older people do not profit from reablement, but it may be unrealistic to expect full self-care.

The outcomes of reablement for people with high healthcare needs require further research as it is probable that they are also contingent on the specific type of underlying medical condition. Nonetheless, particular regressive health problems mean that reablement is bound to fail for some groups and, consequently, medical health data may need to be used alongside assessors' SMT in order to gain a better understanding of what type of reablement programme is needed. Medical health data may also be required to be linked to monitoring data in order for further research to distinguish which types of medical condition are best tackled by reablement. Similarly, it can be assumed that high initial care-need (as measured here by having greater than a care-need of 13 hours or more) will be unlikely to be wholly ameliorated through reablement.

Our analysis found that men did not have significantly different outcomes from reablement than women, and we did not observe any differences by ethnicity. However, only 3.2 per cent of the study population were non-white while 11.8 per cent of Essex residents in general are non-white, which thus limits our conclusions. More significantly, we identified that hospital referral to reablement had a positive bearing on successful reablement. This could mean that cases referred from hospitals tend to be more acute and short-term, and thus more likely to be aided through reablement (e.g. simple improvements to the home environment following a fall), rather than what could potentially be more chronic and on-going health problems as in cases referred from the community.

Using the IMD, we uncovered that living in a deprived neighbourhood reduced the chances of successful reablement by three per cent. Generally, we found that there was non-negligible neighbourhood variation in the reablement success rates and that our statistical model was improved by employing multilevel techniques to control for the clustered and hierarchical nature of the data. Drilling further down into these results by using Mosaic categories, we found that specific Mosaic groups experienced very different reablement outcomes with, for example, group O ('Older tenants in low rise social housing estates where jobs are scarce') having a 15 per cent lower chance of self-care after 13 weeks than the reference category, and group L (wealthy retirees) having a six per cent higher chance.

What this indicates is that the Mosaic categories associated with unpleasant living conditions (especially housing conditions), weak social networks and unfavourable socio-economic positions had a highly significant negative effect on reablement, while those indicating high economic status had strong positive effects. Reassuringly in terms of our statistical modelling, the Mosaic groups that were not directly relevant for old people like group G ('young, well-educated city dwellers') were not significant, even though the direction of the effects followed the previously explored geodemographic direction. In a study with a similar design to ours,

Nnoaham et al. (2010) used Mosaic geodemographic indicators and the IMD to predict uptake in colorectal cancer screening. They also found both measures to be statistically significant, with the Mosaic explaining a greater share of the variance.

Overall, the IMD and Mosaic findings are evidence that there is a need to see successful reablement not merely as a medical process, but one intimately entwined with broader social, economic and community conditions. Our findings demonstrate the relevance of the IMD and Mosaic measures for reablement, and possibly as a more general tool for all community-based social care intervention.

One caveat could be selective neighbourhood residence, namely a scenario in which patients more likely to benefit from reablement are more likely to live in better neighbourhoods. In neighbourhood research, this is often referred to as the issue of composition versus context. Without longitudinal data of the clients' residence history or experimental evidence, this limitation cannot be ruled out. However, our results suggest strongly that local councils could utilise Mosaic to further narrow specific characteristics such as housing conditions to better target reablement programmes.

In terms of avenues for further research, we tested for all possible interactions between the predictor variables (e.g. care-need and gender, as well as cross-level interactions between care-need and neighbourhood or Mosaic characteristics), but none of them reached statistical significance. However, more studies are needed to see whether clients with multiple care-needs or so-called comorbidities have different reablement experiences. Moreover, in order to understand the significant factors that have been identified with more certainty and accuracy, further research is required into the specific nature of individual reablement programmes and the details of the underlying health conditions of reablement clients. Another issue is the long-term effectiveness of reablement programs: it might be that initial benefits are related to

intervention effects where reablement initially boosts a client's positive outlook in the short-term but which become dampened over time when visits from reablement teams end and the realities of trying to cope every day on one's own sinks back into peoples' lives (Wilde and Glendinning, 2012). A possible way to mitigate against this could be to trial short 'booster' reablement sessions at regular intervals to these client groups.

## 5 Conclusion

The uniquely comprehensive dataset provided by Essex County Council which covered the entire population of reablement patients between 2008 and 2012, allowed for a fine-grained analysis of reablement success as measured by health status, age, gender, ethnicity, referral avenue, neighbourhood and geodemographic factors. Reablement success is defined as being in self-care 13 weeks after the end of the reablement intervention as opposed to continued care-need.

Using multilevel logistic regressions, we find that reablement works less well for very old people (95 years or older had a 9 % lower chance); those with very severe care-needs of 15 or more hours (-27%); severe physical disability (-20%); dementia (-11%); and frailty (-6%). However, clients whose main care condition was a temporary illness had a 10 per cent higher chance compared to the main care condition of appreciable physical disability, as did clients aged 60-64 at an eight per cent higher chance. We found no statistically significant gender or ethnic differences. Marital status had no substantial effect overall, but the widowed compared to married clients had a four per cent lower chance of self-care. Hospital referral came with a three per cent higher chance of self-care.

While some other studies have uncovered similar results, what we also show is that neighbourhood deprivation measured through the Index of Multiple Deprivation has a significant negative effect on self-care (-3 %), and, more significantly, Mosaic geodemographic

classifications indicate up to a 25 per cent difference in the chances of successful reablement between the worst (O) and best Mosaic group (F) when compared to the baseline. This demonstrates the underappreciated importance of the social environment in shaping health and recovery, and policy-makers, as well as healthcare practitioners, should consider the social setting when planning and assessing reablement. Future research into reablement outcomes would thus benefit by examining what these neighbourhood factors are so as to identify where further interventions related to reablement might benefit such groups.

## 6 References


ADLER, N. E. & OSTROVE, J. M. 1999. Socioeconomic status and health: what we know and what we don't. *Ann N Y Acad Sci,* 896**,** 3-15.

BERNARD, P., CHARAFEDDINE, R., FROHLICH, K. L., DANIEL, M., KESTENS, Y. & POTVIN, L. 2007. Health inequalities and place: a theoretical conception of neighbourhood. *Soc Sci Med,* 65**,** 1839-52.

BRAGSTAD, L. K., KIRKEVOLD, M., HOFOSS, D. & FOSS, C. 2012. Factors predicting a successful post-discharge outcome for individuals aged 80 years and over. *Int J Integr Care,* 12**,** e4.

DIEZ-ROUX, A. V. 1998. Bringing context back into epidemiology: variables and fallacies in multilevel analysis. *Am J Public Health,* 88**,** 216-22.

DURAN, A. C., DIEZ ROUX, A. V., LATORRE MDO, R. & JAIME, P. C. 2013. Neighborhood socioeconomic characteristics and differences in the availability of healthy food stores and restaurants in Sao Paulo, Brazil. *Health Place,* 23**,** 39-47.

EXPERIAN LIMITED 2004. MOSAIC United Kingdom: The Consumer Classification for the UK. Experian Nottingham,, UK.

EXPERIAN LIMITED 2007. Experian Demographic Data, 2004-2005 and 2008-2011. UK Data Service.

FEINSTEIN, J. S. 1993. The Relationship between Socioeconomic-Status and Health - a Review of the Literature. *Milbank Quarterly,* 71**,** 279-322.

GILL, T. M., BAKER, D. I., GOTTSCHALK, M., PEDUZZI, P. N., ALLORE, H. & BYERS, A. 2002. A program to prevent functional decline in physically frail, elderly persons who live at home. *N Engl J Med,* 347**,** 1068-74.

GITLIN, L. N., WINTER, L., DENNIS, M. P., CORCORAN, M., SCHINFELD, S. & HAUCK, W. W. 2006. A randomized trial of a multicomponent home intervention to reduce functional difficulties in older adults. *J Am Geriatr Soc,* 54**,** 809-16.

GLENDINNING, C., JONES, K., BAXTER, K., RABIEE, P., CURTIS, L., WILDE, A., ARKSEY, H. & FORDER, J. 2010. Home Care Reablement Services: Investigating the Longer-term Inpacts (Prospective Longitudinal Study), Social Policy Research Unit.

GLENDINNING, C. & NEWBRONNER, E. 2008. The Effectiveness of Home Care Reablement — Developing the Evidence Base. *Journal of Integrated Care,* 16**,** 32-39.

HJELLE, K. M., TUNTLAND, H., FORLAND, O. & ALVSVAG, H. 2017. Driving forces for home-based reablement; a qualitative study of older adults' experiences. *Health Soc Care Community,* 25**,** 1581-1589.

JOHNSON, N. J., BACKLUND, E., SORLIE, P. D. & LOVELESS, C. A. 2000. Marital status and mortality: the national longitudinal mortality study. *Ann Epidemiol,* 10**,** 224-38.

JOKELA, M. 2015. Does neighbourhood deprivation cause poor health? Within-individual analysis of movers in a prospective cohort study. *J Epidemiol Community Health,* 69**,** 899-904.

KAWACHI, I. & BERKMAN, L. F. 2003. Neighborhoods and health.

KENNEDY, B. P., KAWACHI, I., GLASS, R. & PROTHROW-STITH, D. 1998. Income distribution, socioeconomic status, and self rated health in the United States: multilevel analysis. *BMJ,* 317**,** 917-21.

KING, A. I., PARSONS, M., ROBINSON, E. & JORGENSEN, D. 2012. Assessing the impact of a restorative home care service in New Zealand: a cluster randomised controlled trial. *Health Soc Care Community,* 20**,** 365-74.

LEWIN, G., ALLAN, J., PATTERSON, C., KNUIMAN, M., BOLDY, D. & HENDRIE, D. 2014. A comparison of the home‐care and healthcare service use and costs of older A ustralians randomised to receive a restorative or a conventional home‐care service. *Health & social care in the community,* 22**,** 328-336.

LEWIN, G., DE SAN MIGUEL, K., KNUIMAN, M., ALAN, J., BOLDY, D., HENDRIE, D. & VANDERMEULEN, S. 2013a. A randomised controlled trial of the Home Independence Program, an Australian restorative home-care programme for older adults. *Health Soc Care Community,* 21**,** 69-78.

LEWIN, G. F., ALFONSO, H. S. & ALAN, J. J. 2013b. Evidence for the long term cost effectiveness of home care reablement programs. *Clin Interv Aging,* 8**,** 1273-81.

MARKLE-REID, M., WEIR, R., BROWNE, G., ROBERTS, J., GAFNI, A. & HENDERSON, S. 2006. Health promotion for frail older home care clients. *J Adv Nurs,* 54**,** 381-95.

NEWBRONNER, L., BAXTER, M., CHAMBERLAIN, R., MADDISON, J., ARKSEY, H. & GLENDINNING, C. 2007. Research into the longer term effects/impacts of re-ablement services.

NNOAHAM, K. E., FRATER, A., RODERICK, P., MOON, G. & HALLORAN, S. 2010. Do geodemographic typologies explain variations in uptake in colorectal cancer screening? An assessment using routine screening data in the south of England. *J Public Health (Oxf),* 32**,** 572-81.

O'CAMPO, P., SALMON, C. & BURKE, J. 2009. Neighbourhoods and mental well-being: what are the pathways? *Health Place,* 15**,** 56-68.

PICKETT, K. E. & PEARL, M. 2001. Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. *J Epidemiol Community Health,* 55**,** 111-22.

PILKINGTON, G. 2013. Homecare re-ablement: Why and how providers and commissioners can implement a service. *Journal of Care Services Management,* 2**,** 354-367.

PLANE, J. & KLODAWSKY, F. 2013. Neighbourhood amenities and health: examining the significance of a local park. *Soc Sci Med,* 99**,** 1-8.

REIDY, H., WEBBER, M., RAYNER, S. & JONES, M. 2013. Evaluation of the Southwark Reablement Service. *London, Kings College*.

ROBLES, T. F. & KIECOLT-GLASER, J. K. 2003. The physiology of marriage: pathways to health. *Physiol Behav,* 79**,** 409-16.

RYBURN, B., WELLS, Y. & FOREMAN, P. 2009. Enabling independence: restorative approaches to home care provision for frail older adults. *Health Soc Care Community,* 17**,** 225-34.

SHARMA, A., LEWIS, S. & SZATKOWSKI, L. 2010. Insights into social disparities in smoking prevalence using Mosaic, a novel measure of socioeconomic status: an analysis using a large primary care dataset. *BMC Public Health,* 10**,** 755.

STEPNER, M. 2017. MAPTILE: Stata module to map a variable.

TINETTI, M. E., BAKER, D., GALLO, W. T., NANDA, A., CHARPENTIER, P. & O'LEARY, J. 2002. Evaluation of restorative care vs usual care for older adults receiving an acute episode of home care. *JAMA,* 287**,** 2098-105.

UK DEPARTMENT OF HEALTH 2012. Caring for our future: reforming care and support. Department of Health London.

WARWICKSHIRE OBSERVATORY. 2012. Using Mosaic to better understand households in Warwickshire. Available: https://warksobservatory.wordpress.com/2012/01/10/using-mosaic-to-better-understand-households-in-warwickshire/.

WILDE, A. & GLENDINNING, C. 2012. ‘If they’ re helping me then how can I be independent?’ The perceptions and experience of users of home‐care re‐ablement services. *Health & social care in the community,* 20**,** 583-590.
WINKLEBY, M. A., JATULIS, D. E., FRANK, E. & FORTMANN, S. P. 1992. Socioeconomic status and health: how education, income, and occupation contribute to risk factors for cardiovascular disease. *Am J Public Health,* 82**,** 816-20.
WOOD, R. G., GOESLING, B. & AVELLAR, S. 2007. The effects of marriage on health: A synthesis of recent research evidence. *Princeton, NJ: Mathematica Policy Research, Inc*.
WORLD HEALTH ORGANISATION 2004. Active ageing: a policy framework. Geneva: WHO; 2002. *http://whqlibdoc. who. int/hq/2002/who_nmh_nph_02,* 8.

# 7 Appendix

*Table 3 Reablement Service Measurement Tool (SMT)*

| **Reablement Service Measurement Tool 1 (R1)** | | | | | | |
|---|---|---|---|---|---|---|
| | **Score** | **4** | **3** | **2** | **1** | **0** |
| **Mobility** | Indoors | Independent without aid | Independent with aid | Physical minimum assistance | Frequent falls/ max assistance | Unable |
| | Outdoors | Independent without aid | Independent with aid | Minimal physical assistance | Maximum physical assistance | Unable |
| | Steps/stairs | Independent | Some difficulty slow but safe | Very slow great physical exertion | At risk | Unable |
| | Transport | Able to access all forms of transport independently | Able to access all forms of transport with min assistance | Able to access all forms of transport with max assistance | Able to access one form of transport with assistance | Unable |
| **Transfers** | Bed | Independent | Slow but safe | Very slow with great physical exertion | Physical assistance required | Unable |
| | Chair | Independent | Slow but safe | Very slow with great physical exertion | Physical assistance required | Unable |
| | Toilet/commode | Independent | Slow but safe | Very slow with great physical exertion | Physical assistance required | Unable |
| | Bath or shower | Independent | Slow but safe | Very slow with great physical exertion | Physical assistance required | Unable |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Personal Care Skills** | Dressing | Independent | Prompts required | Prompts and physical assistance required | Full physical assistance required | Unable |
| | Undressing | Independent | Prompts required | Prompts and physical assistance required | Full physical assistance required | Unable |
| | Washing | Independent | Prompts required | Prompts and physical assistance required | Full physical assistance required | Unable |
| | Bathing or showering | Independent | Prompts required | Prompts and physical assistance required | Full physical assistance required | Unable |
| | Eating | Independent | Some difficulty | Great difficulty | Assistance required | Unable |
| | Drinking | Independent | Some difficulty | Great difficulty | Assistance required | Unable |
| | Toilet hygiene | Independent | Some difficulty | Great difficulty | Physical assistance required | Unable |
| **Home Skills** | Meal preparation/cooking | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable |
| | Washing up/clearing away | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Shopping | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable |
| | Hoovering | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable |
| | Bathroom cleaning | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable |
| | Change bed linen | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable |
| | Laundry | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable |
| | Ironing | Independent | Able with prompts | Able with prompts and min assistance | Requires physical assistance | Unable / unsafe |
| **Sensory** | Speech | No speech problems | Slight difficulty | Significant difficulty | Uses non-verbal communication | Unable |
| | Sight (with glasses) | Satisfactory | Slight difficulty | Significant difficulty | Registered Partially sighted | Registered Blind |
| | Hearing (with aid) | Satisfactory | Slight impairment | Registered deaf with speech | Registered deaf without speech with sign | Registered deaf without speech without sign |
| | Sensation fingers/feet | No impairment of sensation | Slight impairment of sensation | Significant impairment of sensation | Significant impairment of sensation with risk | Neglect to affected area |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Health & Understanding** | Can manage own medication | Independent | Manage with verbal prompts | Manage with directed prompts | Requires physical assistance | Unable |
| | Home environment control | Independent | Manage with verbal prompts | Manage with directed prompts | Requires physical assistance | Unable |
| | Confusion | No confusion | Mild confusion not at risk | Moderate confusion risks managed | At risk | Unsuitable for reablement |
| | Memory | No difficulties | Slight difficulty | Occasional prompts required | Frequent prompt and repetition | Extreme memory loss |
| | Attention/ concentration | Maintains attention/ concentration | Able to maintain attention on one task | Requires prompts to maintain attention to task | Requires prompts and assistance | Unable |
| **Other** | Motivation | Fully motivated | Requires encouragement | Requires directed verbal prompts | Requires prompts and assistance | Unmotivated |
| | Cooperation | Fully co-operative | Requires encouragement | Requires directed verbal prompts | Requires prompts and assistance | Non Co-operative |
| | Can manage own finances | Independent | Minimal assistance | Moderate assistance | Maximum assistance | Unable |
| | Formal care package | None needed independent | Small appropriate package in place | Large appropriate package in place | Inappropriate package | Requires care |
| | Informal carers (family/friends) | Independent but has reg. contact | manages with min support from them | Manages with moderate support | Carer(s) under stress | Carer(s) unable to continue |

*Table 4 Background statistics of the data set of reablement clients by Essex County Council (2008-2012).*

| | Count | Col % |
|---|---|---|
| Continued care | 2,377 | 32.3 |
| Self-care | 4,986 | 67.7 |
| *Age groups* | | |
| 60-64 | 144 | 2.0 |
| 65-69 | 280 | 3.8 |
| 70-74 | 401 | 5.4 |
| 75-79 | 919 | 12.5 |
| 80-84 | 1,575 | 21.4 |
| 85-89 | 1,992 | 27.1 |
| 90-94 | 1,534 | 20.8 |
| 95-99 | 518 | 7.0 |
| *Ethnicity* | | |
| White | 7,119 | 96.7 |
| Non-white | 244 | 3.3 |
| *Gender* | | |
| Female | 4,959 | 67.4 |
| Male | 2,404 | 32.6 |
| *Marital Status* | | |
| Never married | 419 | 6.2 |
| Widowed | 3,732 | 55.4 |
| Divorced/separated | 425 | 6.3 |
| Married/cohabiting | 2,163 | 32.1 |
| *Referral route* | | |
| Community | 1,341 | 18.2 |
| Hospital | 6,022 | 81.8 |
| *Initial care-need in hours* | | |
| 1-3 | 198 | 2.7 |
| 4-6 | 2,109 | 28.6 |
| 7-9 | 2,715 | 36.9 |
| 10-12 | 1,534 | 20.8 |
| 13-15 | 586 | 8.0 |
| 16-23 | 221 | 3.0 |
| *Main care condition* | | |
| Dementia | 259 | 3.5 |
| Frailty | 1,971 | 26.8 |
| Function | 91 | 1.2 |
| Sensory | 96 | 1.3 |
| Physical disability severe | 105 | 1.4 |
| Physical disability appreciable. | 4,220 | 57.3 |
| Physical disability mild | 270 | 3.7 |
| Temporary illness | 351 | 4.8 |
| **Total** | **7,363** | **100.0** |

Source: Essex reablement dataset

*Figure 3 Distribution plots of age, care need, IMD scores and reablement length for the Essex Country Council reablement dataset (2008-2012)*

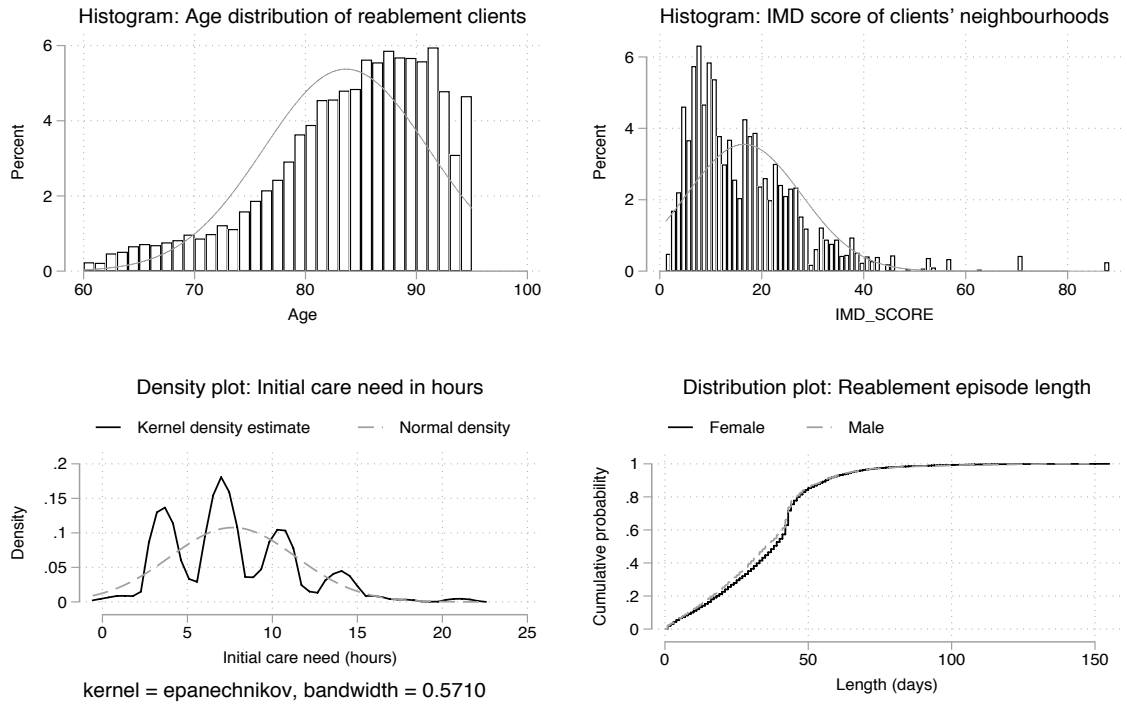


*Table 5 Crosstabulations of covariates with reablement outcomes*

| | Reablement outcomes at 13 weeks | | | |
|---|---|---|---|---|
| | Care need | Self-care | Deceased | *Chi2* |
| | Row % | Row % | Row % | Sig. |
| *Age groups* | | | | |
| 60-64 (n=157) | 21.0 | 70.1 | 8.9 | 102.8 |
| 65-69 (n=290) | 24.5 | 68.6 | 6.9 | *** |
| 70-74 (n=434) | 26.5 | 64.1 | 9.4 | |
| 75-79 (n=987) | 24.7 | 64.7 | 10.5 | |
| 80-84 (n=1,727) | 25.7 | 63.4 | 10.9 | |
| 85-89 (n=2,241) | 28.3 | 57.7 | 14.0 | |
| 90-94 (n=1,690) | 32.7 | 54.9 | 12.4 | |
| 95-99 (n=592) | 35.5 | 48.1 | 16.4 | |
| *Gender* | | | | |
| Female (n=5,371) | 28.9 | 60.6 | 10.4 | 44.2 |
| Male (n=2,747) | 27.2 | 57.2 | 15.5 | *** |
| *Ethnicity* | | | | |
| White (n=7,856) | 28.4 | 59.3 | 12.2 | 2.5 |
| Non-white (n=262) | 25.6 | 64.1 | 10.3 | . |
| *Marital Status* | | | | |
| Never married (n=446) | 25.6 | 65.5 | 9.0 | 121.2 |
| Widowed (n=4,037) | 32.4 | 56.7 | 11.0 | *** |
| Divorced/separated (n=435) | 27.4 | 66.2 | 6.4 | |
| Married/cohabiting (n=2,507) | 25.5 | 59.2 | 15.3 | |
| Missing (n=693) | 17.7 | 68.7 | 13.6 | |
| *Referral route* | | | | |
| Community (n=1,454) | 29.8 | 59.4 | 10.8 | 4.1 |
| Hospital (n=6,664) | 28.0 | 59.5 | 12.5 | . |
| *Main care condition* | | | | |
| Dementia (n=253) | 41.9 | 55.3 | 2.8 | 133.2 |
| Frailty (n=2,115) | 32.6 | 57.2 | 10.2 | *** |
| Function (n=85) | 30.6 | 65.9 | 3.5 | |
| Sensory (n=113) | 23.9 | 59.3 | 16.8 | |
| Phys. dis. severe (n=109) | 47.7 | 45.0 | 7.3 | |
| Phys. dis. appr. (n=4,741) | 26.6 | 59.9 | 13.5 | |
| Phys. dis. mild (n=310) | 24.5 | 59.7 | 15.8 | |
| Temp. illness (n=392) | 16.8 | 71.7 | 11.5 | |
| *Initial care need in hours* | | | | |
| 1-3 (n=215) | 25.6 | 60.9 | 13.5 | 141.2 |
| 4-6 (n=2,303) | 24.1 | 64.9 | 11.0 | *** |
| 7-9 (n=3,004) | 25.9 | 61.8 | 12.3 | |
| 10-12 (n=1,689) | 33.7 | 54.4 | 11.8 | |
| 13-15 (n=652) | 34.8 | 51.5 | 13.7 | |
| 16-23 (n=255) | 45.9 | 35.7 | 18.4 | |
| Total (n=8,118) | 28.4 | 59.5 | 12.2 | |

Source: ECC reablement dataset 2008-2012.

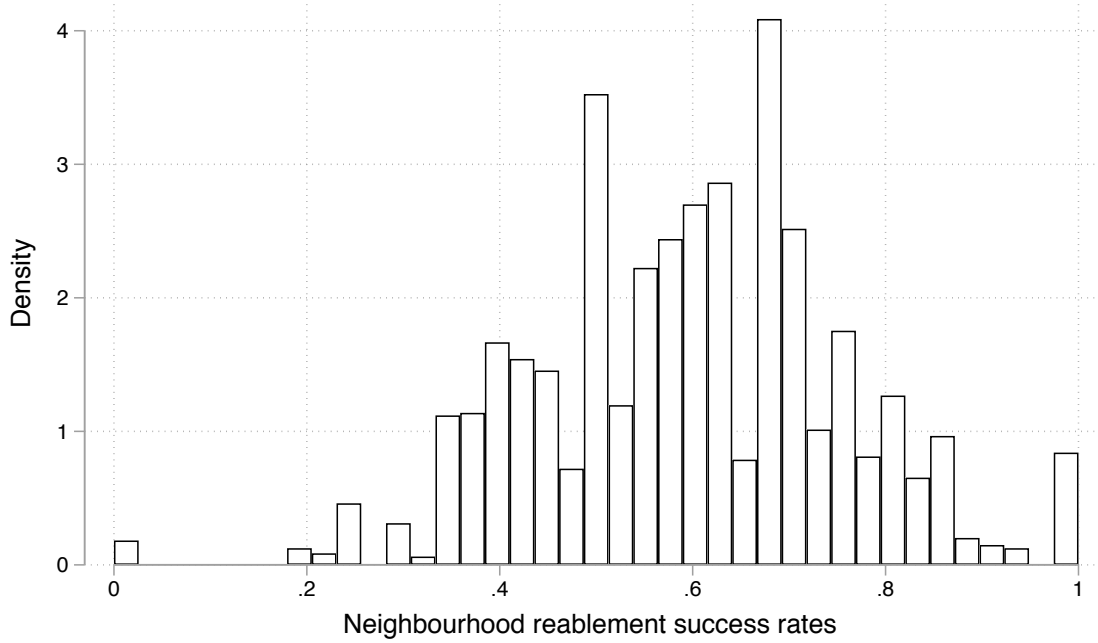
*Table 6 Average marginal effects of the multilevel logistic regression models for self-care after 13 weeks*

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| *Age groups (ref. 85-89)* | | | | | | |
| 60-64 | 0.08* | (0.04) | 0.08* | (0.04) | 0.08* | (0.04) |
| 65-69 | 0.04 | (0.03) | 0.05 | (0.03) | 0.05 | (0.03) |
| 70-74 | 0.01 | (0.03) | 0.01 | (0.03) | 0.02 | (0.03) |
| 75-79 | 0.04+ | (0.02) | 0.04+ | (0.02) | 0.03+ | (0.02) |
| 80-84 | 0.04* | (0.02) | 0.04* | (0.02) | 0.04* | (0.02) |
| 90-94 | -0.04* | (0.02) | -0.04* | (0.02) | -0.04* | (0.02) |
| 95-99 | -0.09* | (0.02) | -0.09* | (0.02) | -0.09* | (0.02) |
| *Gender* | | | | | | |
| Male | -0.02 | (0.01) | -0.02 | (0.01) | -0.02+ | (0.01) |
| *Ethnicity (ref. white)* | | | | | | |
| Non-white | 0.02 | (0.03) | 0.02 | (0.03) | 0.02 | (0.03) |
| *Marital status (ref. married)* | | | | | | |
| Never married | 0.02 | (0.02) | 0.02 | (0.02) | 0.03 | (0.02) |
| Widowed | -0.04* | (0.01) | -0.04* | (0.01) | -0.04* | (0.01) |
| Divorced/separated | 0.00 | (0.03) | 0.01 | (0.03) | 0.01 | (0.03) |
| Missing | 0.10* | (0.02) | 0.10* | (0.02) | 0.10* | (0.02) |
| *Referral avenue (ref. community)* | | | | | | |
| Hospital | 0.03* | (0.01) | 0.03* | (0.01) | 0.03+ | (0.01) |
| *Initial care need in hours (ref. 1-3)* | | | | | | |
| 4-6 | 0.01 | (0.03) | 0.01 | (0.03) | 0.01 | (0.03) |
| 7-9 | -0.01 | (0.03) | -0.01 | (0.03) | -0.01 | (0.03) |
| 10-12 | -0.09* | (0.04) | -0.09* | (0.03) | -0.10* | (0.03) |
| 13-15 | -0.11* | (0.04) | -0.11* | (0.04) | -0.11* | (0.04) |
| 16-23 | -0.27* | (0.05) | -0.28* | (0.05) | -0.28* | (0.05) |
| *Main care need (ref. phys. dis. appre.)* | | | | | | |
| Dementia | -0.11* | (0.03) | -0.11* | (0.03) | -0.11* | (0.03) |
| Frailty | -0.06* | (0.01) | -0.05* | (0.01) | -0.06* | (0.01) |
| Function | -0.04 | (0.05) | -0.04 | (0.05) | -0.04 | (0.05) |
| Sensory | 0.05 | (0.04) | 0.05 | (0.04) | 0.05 | (0.04) |
| Physical disability severe | -0.20* | (0.05) | -0.20* | (0.05) | -0.19* | (0.05) |
| Physical disability mild | 0.02 | (0.03) | 0.02 | (0.03) | 0.02 | (0.03) |
| Temporary illness | 0.10* | (0.02) | 0.10* | (0.02) | 0.10* | (0.02) |
| *IMD score (2.std.)* | | | -0.03* | (0.01) | | |
| *Mosaic (ref. B)* | | | | | | |
| A | | | | | 0.03 | (0.03) |
| C | | | | | 0.06 | (0.05) |
| D | | | | | 0.04* | (0.02) |
| E | | | | | 0.01 | (0.02) |
| F | | | | | 0.09* | (0.03) |
| G | | | | | 0.04 | (0.05) |
| H | | | | | 0.06 | (0.05) |
| I | | | | | -0.08* | (0.04) |
| J | | | | | 0.01 | (0.03) |
| K | | | | | -0.05+ | (0.02) |
| L | | | | | 0.05* | (0.02) |
| M | | | | | 0.00 | (0.02) |
| N | | | | | 0.06 | (0.06) |
| O | | | | | -0.14* | (0.06) |
| Observations | 7130 | | 7130 | | 7130 | |

Standard errors in parentheses

="+ p<0.10 * p<0.05"

*Figure 4 Histogram of the neighbourhood (LSOA) reablement success rates of self-care*



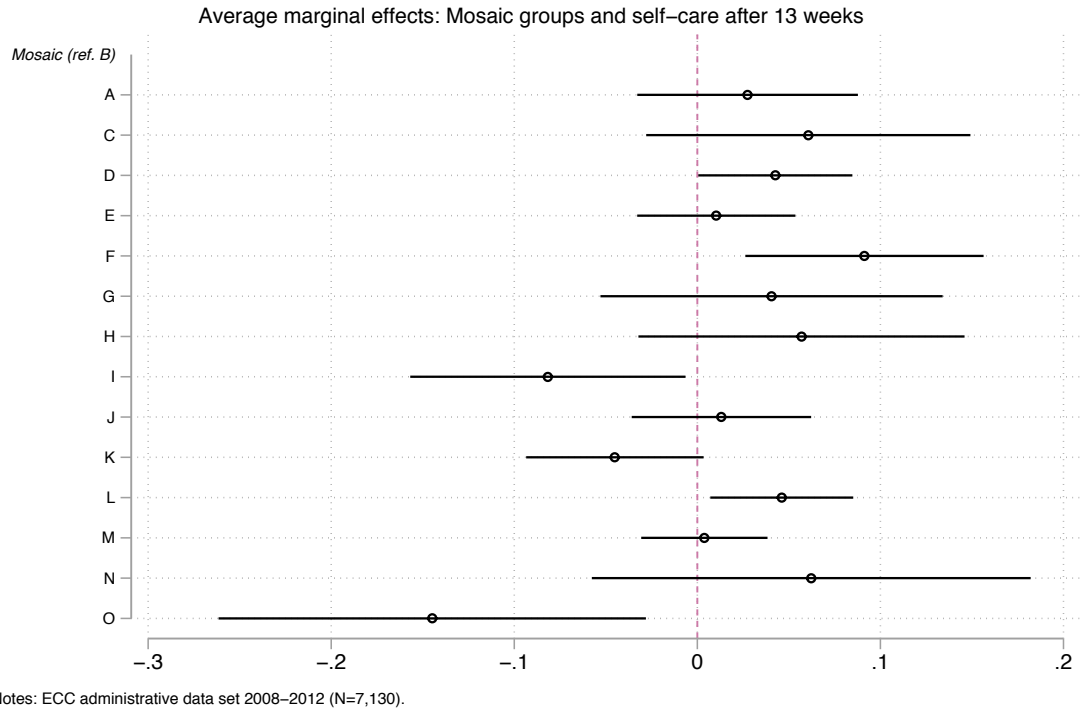

Note: ECC reablement data set 2008–2012 (N=7,130).

*Table 7 Distribution of Mosaic (201) categories in Essex*

| Mosaic | Self care after 13 weeks Care need Row % | Self-care Row % | Deceased Row % | Chi2 Sig. |
|---|---|---|---|---|
| A (n=293) | 27.6 | 63.1 | 9.2 | 78.0 |
| B (n=1,631) | 28.8 | 57.4 | 13.7 | *** |
| C (n=116) | 24.1 | 66.4 | 9.5 | |
| D (n=769) | 24.6 | 62.8 | 12.6 | |
| E (n=759) | 27.5 | 58.5 | 14.0 | |
| F (n=224) | 20.1 | 67.4 | 12.5 | |
| G (n=113) | 24.8 | 64.6 | 10.6 | |
| H (n=111) | 25.2 | 66.7 | 8.1 | |
| I (n=216) | 34.3 | 49.5 | 16.2 | |
| J (n=504) | 29.0 | 59.9 | 11.1 | |
| K (n=579) | 33.9 | 54.6 | 11.6 | |
| L (n=1,017) | 25.3 | 61.3 | 13.5 | |
| M (n=1,632) | 30.8 | 59.7 | 9.5 | |
| N (n=65) | 21.5 | 66.2 | 12.3 | |
| O (n=89) | 39.3 | 42.7 | 18.0 | |
| Total (n=8,118) | 28.4 | 59.5 | 12.2 | |

Source: ECC reablement dataset 2008-2012.

*Figure 5 Visual representation of the average marginal effects of the Mosaic (2010) categories*




Notes: ECC administrative data set 2008–2012 (N=7,130).

*Table 8 Multilevel logistic regression results of self-care after 13 weeks including IMD and MOSAIC (2010) categories*

| | **Model 1** | | **Model 2** | | **Model 3** | |
|---|---|---|---|---|---|---|
| *Age groups (ref. 85-89)* | | | | | | |
| 60-64 | 1.53* | (0.33) | 1.53* | (0.33) | 1.56* | (0.34) |
| 65-69 | 1.24 | (0.19) | 1.25 | (0.20) | 1.27 | (0.20) |
| 70-74 | 1.06 | (0.14) | 1.07 | (0.14) | 1.08 | (0.14) |
| 75-79 | 1.19+ | (0.11) | 1.19+ | (0.11) | 1.18+ | (0.11) |
| 80-84 | 1.22* | (0.09) | 1.21* | (0.09) | 1.22* | (0.09) |
| 90-94 | 0.83* | (0.06) | 0.83* | (0.06) | 0.83* | (0.06) |
| 95-99 | 0.67* | (0.07) | 0.67* | (0.07) | 0.66* | (0.07) |
| *Gender* | | | | | | |
| Male | 0.91 | (0.05) | 0.91 | (0.05) | 0.91+ | (0.05) |
| *Ethnicity (ref. white)* | | | | | | |
| Non-white | 1.10 | (0.17) | 1.10 | (0.17) | 1.11 | (0.17) |
| *Marital status (ref. married)* | | | | | | |
| Never married | 1.13 | (0.14) | 1.13 | (0.14) | 1.14 | (0.14) |
| Widowed | 0.83* | (0.05) | 0.84* | (0.05) | 0.84* | (0.06) |
| Divorced/separated | 1.01 | (0.13) | 1.03 | (0.13) | 1.04 | (0.13) |
| Missing | 1.73* | (0.20) | 1.73* | (0.20) | 1.72* | (0.20) |
| *Referral avenue (ref. community)* | | | | | | |
| Hospital | 1.15* | (0.08) | 1.16* | (0.08) | 1.15* | (0.08) |
| *Initial care need in hours (ref. 1-3)* | | | | | | |
| 4-6 | 1.07 | (0.19) | 1.07 | (0.19) | 1.05 | (0.18) |
| 7-9 | 0.97 | (0.17) | 0.97 | (0.17) | 0.95 | (0.16) |
| 10-12 | 0.64* | (0.11) | 0.64* | (0.11) | 0.63* | (0.11) |
| 13-15 | 0.59* | (0.11) | 0.59* | (0.11) | 0.59* | (0.11) |
| 16-23 | 0.30* | (0.07) | 0.30* | (0.07) | 0.29* | (0.06) |
| *Main care need (ref. phys. dis. appre.)* | | | | | | |
| Dementia | 0.61* | (0.08) | 0.61* | (0.08) | 0.61* | (0.08) |
| Frailty | 0.76* | (0.05) | 0.77* | (0.05) | 0.77* | (0.05) |
| Function | 0.82 | (0.20) | 0.82 | (0.20) | 0.82 | (0.20) |
| Sensory | 1.31 | (0.31) | 1.31 | (0.31) | 1.29 | (0.31) |
| Physical disability severe | 0.41* | (0.09) | 0.41* | (0.09) | 0.42* | (0.09) |
| Physical disability mild | 1.11 | (0.16) | 1.12 | (0.16) | 1.12 | (0.16) |
| Temporary illness | 1.77* | (0.26) | 1.78* | (0.26) | 1.79* | (0.26) |
| *IMD score* | | | 0.88* | (0.05) | | |
| *Mosaic (ref. B)* | | | | | | |
| A | | | | | 1.14 | (0.17) |
| C | | | | | 1.36 | (0.32) |
| D | | | | | 1.23+ | (0.13) |
| E | | | | | 1.05 | (0.11) |
| F | | | | | 1.61* | (0.30) |
| G | | | | | 1.22 | (0.30) |
| H | | | | | 1.33 | (0.32) |
| I | | | | | 0.69* | (0.12) |
| J | | | | | 1.07 | (0.13) |
| K | | | | | 0.81+ | (0.09) |
| L | | | | | 1.26* | (0.13) |
| M | | | | | 1.02 | (0.09) |
| N | | | | | 1.37 | (0.44) |
| O | | | | | 0.52* | (0.13) |
| Var (LSOA) | 0.08* | (0.03) | 0.08* | (0.03) | 0.06* | (0.03) |
| Observations | 7130 | | 7130 | | 7130 | |
| Log lik. | -4317.6 | | -4315.0 | | -4297.6 | |
| LR test vs logistic (p-value) | 0.00 | | 0.00 | | 0.01 | |
| Chi-squared | 299.8 | | 303.7 | | 335.1 | |
| Aic | 8691.2 | | 8687.9 | | 8679.3 | |
| ICC | 0.02 | | 0.02 | | 0.02 | |
| LR test (chi2) | | | 5.24 | | 34.6 | |
| LR test (p-value) | | | 0.02 | | 0.00 | |
| Observations | 7130 | | 7130 | | 7130 | |

Exponentiated coefficients; Standard errors in parentheses

="+ p<0.10 * p<0.05"