PSSRU

Personal Social Services Research Unit

An Analysis of the Economic Impacts of the British Red Cross Support at Home Service

Josie Dixon[1], Sophia Winterbourne[1], Daniel Lombard[1], Sarah Watters[1], Marija Trachtenberg[1], Martin Knapp[1]

and

Sarah Joy[2], Susana Corral[2], Femi Nzegwu[2], Alison McNulty[2]

[1] Personal Social Services Research Unit, LSE
[2] Research, Evaluation and Impact team, British Red Cross

University of Kent

LSE

Acknowledgements

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Introduction

In 2012, the Research, Evaluation and Impact (RE&I) team at the British Red Cross undertook an evaluation of the British Red Cross Support at Home[1] services (Joy *et al.*, 2013). The main aim of the research was to gain a better understanding of the difference made by the service for their service users and to grow their evidence base.

Alongside the evaluation, the RE&I team entered into two collaborative studies. One of these was with a team at the Personal Social Services Research Unit (PSSRU), London School of Economics and Political Science, who were asked to carry out an economic evaluation of Support at Home services. The economic evaluation was carried out independently by the team at PSSRU and designed to complement the British Red Cross' own evaluation, focusing on the outcomes that were found in *Exploring the Difference Made by Support at Home* (Joy *et al.*, 2013) to be statistically significant.

This report sets out the methods and findings from the economic evaluation. The economic evaluation was part-funded by the British Red Cross, with additional support provided by the NIHR School for Social Care Research, as part of a wider programme of work exploring the economic implications of a selection of social care interventions.

Background

Support at Home services

The Support at Home programme delivered by the British Red Cross offers short-term practical and emotional support at home. Services are geared towards helping people to build their confidence and regain their independence during times of particular difficulty, such as following a period in hospital. Delivered by a combination of paid staff and trained volunteers, the Support at Home service is provided within a multi-agency framework alongside other health, social care and community-based services. Service users can be of any age, but are commonly older people living with disability and are often socially isolated. Support at Home services are delivered out of 20 Red Cross areas across the United Kingdom. Local services vary in focus and approach in order to reflect local needs and commissioner priorities. For the purposes of the economic evaluation, however, the PSSRU team focused on four of the Support at Home services included as part of the British Red Cross' own effectiveness evaluation (Joy *et al.*, 2013).

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[1] The service has recently undergone a name change to Support at Home. It used to be called Care in the Home (CITH).

Risks and support needs

The period following hospital discharge can be a vulnerable time for some older patients. One Canadian study, for example, assessed a sample of elderly patients as they were discharged from acute care medical and surgical units and found that almost 40 per cent of the older people were considered at risk of adverse outcomes; that 11 per cent indicated depression; that 45 per cent indicated psychological distress; that 13 per cent showed cognitive impairment; and that just over 62 per cent had at least one nutritional concern (Preyde and Chapman, 2007).

Emergency re-admission (unplanned readmission within 28 days of leaving hospital) is a key risk for older people, with the rate for those over the age of 75 having increased from 11.35 per cent in 2000/01 to 15.3 per cent in 2010/11 (Department of Health, 2013). Emergency re-admission may occur for a number of reasons, including falls, malnutrition or incontinence (Andrews, 1986; Brantervik *et al.*, 2005), complications related to medication (Foust *et al.*, 2005) or complications associated with depression and other mental health issues (Gaylord and Zung, 1987). Older people recently discharged from hospital are also susceptible to weight loss (Alibhai *et al.*, 2005) and to functional decline (Inouye *et al.*, 2000; Boyd *et al.*, 2008; Sager *et al.*, 1996; Hughes *et al.*, 2008).

Support at Home service users are more likely to live alone. Those living alone are more likely to experience higher rates of mortality, to be lonely, and to have increased blood pressure, poor self-rated physical health, and depression (Dickens *et al.*, 2011; Windle *et al.*, 2011; Cacioppo *et al.*, 2006; Prince et al, 1997). Social isolation is also one of the factors (alongside factors such as anxiety, depression, and sensory and cognitive impairments) identified by Preyde and Chapman (2007) that can prevent older people from effectively accessing services that are of potential benefit to them.

Evidence of effectiveness of similar, community-based services

Evidence on the effectiveness of interventions similar to Support at Home services is mixed and can be difficult to interpret, for reasons that include variation in the types of interventions, small and often self-selecting samples, issues with attrition, different measures used in different studies and the difficulties of finding suitable control groups. However, overall, there is evidence that in-home support to older people, particularly at vulnerable times, can be effective in improving quality of life and other outcomes.

A key study in this area, examining the outcomes and cost-effectiveness of initiatives offering emotional and practical support to older people, is the evaluation of the Partnerships for Older People Projects (POPPs) (Windle *et al.* 2009). POPPs was a pilot approach involving 146 core projects implemented in 29 local authority areas. Around two-thirds of these projects were directed at tackling social isolation and exclusion amongst older people and promoting healthy living, while the remaining third involved health, social and community services working together to prevent avoidable hospital admissions and to support people after hospital discharge. Across all types of projects, a range of positive outcomes were reported. In projects offering community support, pro-active case coordination and specialist falls programmes, three to four per cent improvements in health-related quality of life were found. However, in projects offering hospital discharge and complex care, a very slight deterioration in health-related quality of life was observed (a decline of

just under two per cent), although these individuals fared better than the comparative sample. Evidence also showed that for users receiving 'well-being or emotional' interventions, a category that included befriending, fewer people reported being depressed or anxious following the intervention (58 per cent saying they were not anxious or depressed before the intervention, and 63 per cent saying they were not anxious or depressed after the intervention).

In a Norwegian study, Bragstad at al. (2012) interviewed 142 people aged 80 and over who were living in their own homes having recently been discharged from hospital. They found that the odds of managing well after a hospital discharge were nearly five times higher for patients who reported that someone – a relative or homecare services worker – was present at their homecoming compared to those who came home to an empty house.

Various studies have also found a link between volunteer programmes and life satisfaction measures. For example, an evaluation of the Volunteer Friendly Visitor Programme in Canada (MacIntyre *et al.*, 1999), consisting of visits by volunteer undergraduate students from a local university to frail older people, living alone and housebound, found statistically significant differences with regards to life satisfaction at six weeks. Similarly, an evaluation of the Senior Companion Program in the US (Rabiner *et al.*, 2003), in which volunteers helped older people with the tasks of daily living and provided companionship, found statistically significant improvements in service users' well-being at three months follow-up (this effect was attenuated at nine months, although the authors attributed this primarily to sample attrition). Other outcomes in this evaluation included modest effects on depressive symptoms and unmet need during mealtimes, and a number of positive carer outcomes, including improved coping skills.

In many of these initiatives, befriending is a key component. Mead *et al.* (p.96, 2010) defines befriending as 'an intervention that introduces the client to one or more individuals whose main aim is to provide the client with additional social support through the development of an affirming, emotion-focused relationship over time.' Befriending aims primarily to relieve loneliness and social isolation, which affects an estimated 5–16 per cent of older people in the UK (O'Luanaigh and Lawlor, 2008, Knapp *et al.*, 2010) and has been linked to depression and cognitive decline (Cacioppo *et al.*, 2006; Lester *et al.*, 2012; Wilson *et al.*, 2007). In a systematic review and meta-analysis of 24 randomised controlled trials of befriending interventions, Mead *et al.* (2010) found a modest, but significant, effect on depressive symptoms in the short term and the long term.

Cost implications

There is limited evidence about the cost-effectiveness of such schemes. Bauer *et al.* (2011) carried out a cost effectiveness study of befriending services for older people, involving visits to the person's home, usually for an hour each week or fortnight. The study found that, in the first year, it cost £85 for 12 hours of befriending contact and that total gross cost savings to the NHS were around £40, suggesting that from a public services budget perspective the services were not cost-saving. However, additional quality of life benefits of £270 per person were identified and the authors concluded that although befriending interventions were unlikely to achieve cost savings to the public purse, they could improve an individual's quality of life at a low cost. The authors also thought that the targeting of at-risk groups, such as older people discharged from hospital, could potentially offer

better returns on investment. Overall, the POPPs projects, described above, were also considered to be cost-effective with £1.20 saved on emergency bed days for every £1 spent (Windle *et al.*, 2009). However, a related study conducted by Steventon *et al.* (2011) explored eight of the POPPs hospital-facing interventions (covering a range of health, social service and community- and volunteer-based schemes), and using a matched set of patients as a control, to explore their impact on hospital admissions. They found no evidence of a reduction in emergency hospital admissions associated with the interventions.

Aims and design of the economic evaluation

The aim of the economic evaluation carried out by PSSRU, and reported here, was to examine the economic consequences of the British Red Cross Support at Home services. The economic evaluation focused on outcomes from the British Red Cross' evaluation (Joy *et al.*, 2013) for which statistically significant improvement was found (between the start of the intervention and the end of the intervention). Estimates for the modelling were derived directly from the British Red Cross data, and a rapid review of the literature was also undertaken to inform the study and to identify additional estimates for the modelling. The analysis was based on simple decision analytic modelling. This method identifies different possible pathways through the Support at home intervention, the probabilities of service users taking these different paths, and associated costs and savings. The model is not intended to accurately represent the whole service user journey, but rather to be a substantial simplification focusing on those aspects to which costs and savings figures may be attached.

Sampling

Site selection and identifying research participants

For the purposes of the economic evaluation, the PSSRU team focused on those Support at Home services that were analysed as part of the British Red Cross' own effectiveness evaluation (Joy *et al.*, 2013).

British Red Cross Support at Home services in five locations - London, Yorkshire, Northern Ireland, Scotland and Wales - were selected to take part in the British Red Cross evaluation. This selection was designed to reflect a range across variables of interest, including geography – to ensure coverage in the four countries of the UK; continuation of contract funding; size of service and type of service. The selected sites will reflect many but not all Support at home services across the country. Services providing personal care were excluded and no A&E based services were represented among the selected sites.

Although the British Red Cross evaluation included five services, only four of these services were included in the economic evaluation. These were:

- In **London,** the 'Next Steps' project is based in a large hospital. British Red Cross staff take referrals from the discharge teams on a number of different hospital wards. The service provides up to four volunteer home visits over a four-week period, as well as telephone calls to check whether people have any support needs and how they are coping at home after discharge. Support is provided according to people's needs. Examples of activities include accompanying to and from GP appointments, prescription collection, collecting or assisting with shopping, help to access social services and/or other community support, engaging in friendly chatting and providing company.

- In **Yorkshire,** the 'Care in the Home' service is provided for an average of six weeks and is delivered by a mix of trained staff and volunteers. The service can offer social visits and support for rebuilding confidence, help with essential light household chores, shopping, prescription collection and information about other support services in the local area. Trained staff and volunteers also provide help with changing anti-embolic stockings, a specialist component of this service, following discharge from hospital after an operation.

- In **Northern Ireland,** the 'Care in the Home' service consists of an 8-week programme for people referred to the Red Cross by Health and Social Care Trust staff. Each service user is matched with a volunteer and receives an average of one visit per week, which will vary in duration depending on the activity undertaken. The service provides home support, transportation, access to wheelchairs, accompanied shopping, therapeutic care massage and accompanying service users to local clubs or groups with the aim of promoting the physical, mental, social and emotional health & wellbeing of older people. This service has recently been increased to 12 weeks following service user and volunteer feedback.

- In **Scotland**, the 'Neighbourhood /Community' service is provided for up to 12 weeks, focusing on linking people in to existing services and providing volunteer-led services such as befriending. The project provides an extensive information, advice and signposting programme to people with low-level social needs to assist their engagement with their community and provides information that enables them to better manage their day-to-day activities. Social support is also offered in the form of a weekly visit or outing with a volunteer depending on the individual's specific needs.

The economic evaluation data from the four areas above were analysed together. The fifth service selected in the Red Cross study - 'Floating Tenancy Support Service' provided in Wales - is somewhat different in focus, intensity and service provision. It is largely staff-delivered and has a younger service user base. It was therefore decided not to combine this site with the other four for the purpose of this analysis. The sample size in Wales was insufficient to support an economic analysis for that site only.

During the fieldwork period, all referrals that became service users in these areas were invited to take part in the British Red Cross evaluation by the service staff. This happened following their initial Support at Home service assessment, but before their first service visit. Service users were fully briefed on the purpose of the study and on what participation would involve in order for them to

decide whether they would like to participate. Signed consent was sought before the interview took place.

Across the four sites, 75 people were interviewed before their Support at Home service had begun, and 52 interviews were achieved with these service users at follow-up after the service had ended. The British Red Cross boosted the sample size for the main evaluation with some one-off interviews in the sites where numbers were low. However, due to the slightly different nature of these interviews, they were not included in the economic analysis. The pre- and post- service interviews were administered to service users in their own home. The questionnaires and further detail about the fieldwork for the main evaluation can be found in the main evaluation report, *Exploring the Difference Made by Support at Home* (Joy *et al.*, 2013).

Sample characteristics

The final sample for this analysis consisted of 52 people (London, 20; Yorkshire, 25; Northern Ireland, 5; Scotland, 2). The majority (91 per cent) were over the age of 65 with a mean age of 76. Three-quarters of the sample were female compared to a national figure for people aged 65 and over of 55.2 per cent (ONS, 2013). The majority (80 per cent) were of white ethnicity compared to a national figure for older people (over aged 65 for men and 60 for women) of 95.8 per cent (ONS, 2011). Sixty-five per cent were living alone compared to the national average of 37 per cent of those aged 65 and over and 49 per cent of those aged 75 and over (Age UK, 2013). Approximately three-quarters of the sample (74 per cent) reported having long-term health conditions that affected their day-to-day lives, and over half (58 per cent) considered themselves to have a disability. In comparison, Age UK (2013) report that, nationally, 36 per cent of people between the ages of 65 and 74, and 47 per cent of people over 75, have a long-term illness that limits their abilities in some way. This figure increases with age with more than two-thirds of individuals over 85 reporting a disabling, long-term condition.

Across the four sites, service users received an average of 10.5 hours of contact time per person (involving both paid staff and volunteers). However, services are provided according to the needs of the service user, which can vary greatly. Hence, this contact time ranged from a minimum of four hours to a maximum of 40 hours.

Service outcomes

The British Red Cross evaluation explored a range of potential outcomes and impacts, including service users' ability to carry out daily activities, to enjoy and participate in leisure activities and to manage their finances, as well as how they felt with regard to their coping skills and subjective well-being, and whether they felt emotionally supported. The majority of the items were graded on 5-point Likert scales, with some open-ended questions also included. Further information on the

evaluation findings can be found in the report of the main evaluation, *Exploring the Difference Made by Support at Home* (Joy *et al.*, 2013)

The outcomes for which service users, in the four sites, experienced significant improvement were:

1. *Increased ability to manage daily activities:* Looking after oneself, doing daily tasks around the home and getting out and about.

2. *Improved well-being:* Feeling in good spirits and feeling good about oneself.

3. *Increase in leisure activities:* Having activities that one enjoys doing with one's time.

The first two service user outcomes listed above were taken as the focus of the economic analysis. For clarity, the model for each of these outcomes is presented separately (see Chapters 7 and 8), although the results are drawn together and presented in Chapter 9. Having leisure activities that one enjoys (the third outcome listed above) was also one where improvements were found to be statistically significant. However, this outcome was considered to be closely related to subjective well-being, and it was not possible to identify any separate economic implications. It was therefore excluded from the economic analysis reported here.

It is worth noting that other positive changes were also highlighted in the British Red Cross evaluation, particularly in the qualitative interviews with service users, staff, volunteers and referrers. These wider benefits were:

1. *Enabling safe discharge:* Providing reassurance (to both service users and referrers) that service users will be checked on regularly and there will be someone to turn to when they get home

2. *Supporting carers:* Alleviating some of the stress for carers and giving valuable information on local sources of support

3. *Enabling patient advocacy*: Supporting service users to get help where it is required and ensuring their needs are met

However, as these outcomes were drawn from the qualitative data collected by the British Red Cross as part of its evaluation, they could not be included in the economic model.

The British Red Cross evaluation was not able to identify a control group for its main evaluation. For ethical reasons, everybody that is eligible and referred to the British Red Cross is granted the service and no other similar group of service users could be identified for the purposes of forming a control group. For this reason the economic evaluation conducted by the PSSRU team could not draw upon the main evaluation to model a comparator scenario (that is a scenario of 'usual care' in which there is no Support at Home intervention and with which the costs and benefits of the intervention could be compared). Nor could any suitable 'proxy' comparator be identified.

The lack of control group meant that it was unclear what level of improvement one might expect to observe in similar service users who do not have access to the Support at Home intervention. On the one hand, it is likely that service users recently discharged from hospital would be increasingly able to carry out daily tasks and have better subjective well-being as they recover from the acute

condition that caused them to be hospitalised. Statistically, this is a phenomenon referred to as regression to the mean, reflecting a return to a normal state following a situation of crisis. Many service users were also likely to be concurrently receiving support from health and other services, which are also designed, in different ways, to support service users' recovery and ability to live independently. On the other hand, older people recently discharged from hospital are at particular risk of adverse outcomes, many of which are potentially avoidable with appropriate prevention, care and support.

Although the impact of the Support at Home intervention cannot be quantified, it may have contributed to observed improvements in daily activities and subjective well-being in a range of ways. Qualitative evidence from the British Red Cross evaluation suggested that, for example, escorting people home from hospital and making house visits and telephone calls was reassuring and helped reduce anxiety. Accompanying service users on visits out of the house was felt to provide both reassurance and encouragement and increase people's confidence and motivation, thus getting them 'back on their feet' more quickly. Support at home volunteers and staff helped to identify and remedy falls-risks in the home, checked that there was food in the fridge and that people were eating properly, and also checked that people knew when they should be taking medication and that they had the right tools and aids to help them do this. They were also seen as providing a degree of companionship and social support that helped address loneliness and social isolation. The Support at Home service also helped to address wider needs by providing advice and information tailored to the needs of individuals and provided a range of referrals and sign-posting to other appropriate services and support, including befriending and other community-based services.

Economic modelling approach

Threshold analysis

The economic analysis used a threshold analysis, a useful economic modelling approach where obtaining comparator data is not feasible. In the 'intervention arm' of the model, two models (decision trees showing the different possible pathways, outcomes and costs) were created: one for the scenario at the beginning of the intervention and another for the scenario at the end of the intervention. The differences between the models at these two time points indicates the improvements and changes occurring over the course of the intervention and the economic values associated with these changes.

The analysis also utilizes a hypothetical 'comparator' (a 'non-intervention arm'). This uses the same basic assumptions as the intervention arm. At the beginning of the intervention, values for the proportion needing or not needing help with daily activities, or for experiencing good or poor well-being, were assumed to be identical to the values found at the beginning of the intervention in the intervention arm. In this way, we are modelling a comparator with the same level of initial needs.

We do not know what changes the hypothetical sample of people in the non-intervention arm is likely to have experienced. We know that at the end of the intervention, however, the values for the

proportion needing or not needing help with daily activities, or for experiencing good or poor well-being, will lie somewhere in between two extremes. These are:

i)   the same values observed in the intervention arm are also observed in the non-intervention arm. In other words, both the intervention arm and non-intervention arm have delivered the same level of improvements. In this scenario, the Support at Home service has had no effect at all;

ii)   the values at the end of the intervention in the non-intervention arm are the same as at the beginning of the intervention, a situation where there is no improvement at all in the non-intervention arm. In other words the Support at Home intervention is responsible for all observed improvements.

There is a point between these two extremes where the combined value of costs and benefits in the non-intervention arm are identical to the combined value of costs and benefits in the intervention arm. This is effectively the point at which any economic benefits associated with the intervention are equal to the costs of providing the intervention. While we cannot quantify the economic benefits that are directly attributable to the Support in the Home service, we do know the cost of the intervention and can calculate what proportion of the observed improvements that the Support at Home intervention would need to be responsible for, at a minimum, for the service to be considered cost-effective (on the basis of the identified economic benefits).

Societal perspective

The economic evaluation used a societal perspective. Hence, costs, benefits and savings falling to primary and secondary health services, social care services, and to service users and their families are all included. A breakdown of identified savings is provided throughout, distinguishing, as far as possible, between savings falling to primary care health services, secondary care health services, social care services, individual out of pocket expenses and other (e.g. opportunity) costs falling to individuals.

Timeframe

Costs and benefits were modelled for a six-month period following the end of the intervention. The appropriate time frame for the model is inevitably a judgment. Six months seemed reasonable given the length and nature of the Support at Home intervention and was sufficient to cover the identified potential health costs associated with the increased risks experienced during the post-discharge period, included in the model (treatment for falls, malnutrition and depression).

Cost of providing the service

The average per service user cost of providing the intervention across the four sites was estimated at £169 (£127 excluding volunteer time).

To identify this cost, the research team at the British Red Cross provided the research team at LSE with the average direct cost per service user at each site, by taking the budgets for three Support at Home services (London, Yorkshire and Northern Ireland) covering the period July 2012 to December 2012 and dividing this by the total number of clients seen during this period. (Since only two of the total sample of 52 service users were based in Scotland, the service in Scotland was simply assumed to have the average cost across the other three sites.) The resulting per service user figure covered all expenditure and included all direct staff and volunteer costs, travel, training, office supplies, insurance, hospitality and catering, communications, equipment, service consumables, management and other miscellaneous costs.

The total number of volunteer contact hours for each site in this period was also identified and valued using an opportunity cost (what it is assumed the volunteer would be earning if they were not volunteering). There are alternative assumptions that could be made for this, including national minimum wage, national median gross hourly earnings as reported in the Annual Survey of Hours and Earnings, or the market rate for someone performing the same or similar role. The minimum wage of £6.19 per hour (see https://www.gov.uk/national-minimum-wage-rates) was used in this case. The total value of volunteer hours was divided by the number of clients seen during this period and added to the direct costs.

The average per service users (i.e. per intervention) figure for each area was £143 in London (£119 costs to British Red Cross, £24 volunteer time), £244 in Northern Ireland (£185 costs to British Red Cross, £59 volunteer time) and £174 (£122 costs to British Red Cross, £52 volunteer time) in East Yorkshire. The variation in these figures reflects different service types, lengths of intervention and delivery structures.

The overall average per service user figure of £169 was calculated by taking the three site averages and weighting them by the sample numbers in the main evaluation for each area. The calculation for this was as follows ((£143*20) + (£244*5) + (£174*25)) / 50 = £169.

Attaching economic value to the daily activities outcome

The outcome 'daily activities' was assessed by three separate survey questions in the British Red Cross evaluation (Joy *et al.*, 2013). These were:

> *Thinking about your daily activities, how able are you to do the following:*
>
> *[scores from 1 'cannot do at all' to 5 'certain can do']*

1. *To look after yourself, for example, to wash, get dressed …*

2. *To do daily tasks around the home, for example tidying, cleaning …*

3. *To get out and about, for example, go shopping, do your errands …*

Together these appear to cover a range of activities of daily living (ADLs) (e.g. bathing, feeding and eating, toileting, personal care and hygiene and functional mobility) and a number of instrumental activities of daily living (IADLs) (e.g. shopping, food preparation, housework and travelling outside the home). Statistically significant improvements against this outcome were identified in the British Red Cross evaluation, with service users becoming, over the period of the intervention, more able to undertake daily activities. The mean response at the beginning of the intervention was 2.6, and at follow-up it was 3.67 (t=-6.08, p < 0.001).

For the economic modelling, service users who gave responses of 1 or 2 to at least one of the daily activities questions were grouped together and classified as needing help with daily activities. At the beginning of the intervention 76.2 per cent of service users needed help with at least one of the daily activities, while at the end of the intervention this figure had reduced to 41.6 per cent. Hence, over the course of the intervention, 34.6 per cent of the sample improved from needing help with daily activities to not needing help with daily activities.

If we consider the different daily activities individually, we find that, between the beginning and the end of the intervention, the reduction in the proportion of service users needing help for each activity were as follows:

- *looking after themselves* - reduced from 20.5 per cent to 7.7 per cent

- *daily tasks around the home* - reduced from 56.8 per cent to 22.4 per cent

- *getting out and about* - reduced from 65.9 per cent to 32 per cent

Note that these percentages add up to more than 76.2 per cent (at the beginning of the intervention) and 41.6 per cent (at the end of the intervention), because some people needed help with more than one daily activity.

Secondary impacts for 'daily activities' – identifying the associated costs

In order to model the economic implications of these observed improvements, it was necessary to identify associated secondary impacts to which economic values could be attached. For this, we identified:

1. Care and support needs (and the associated costs of providing care and support)

2. Risk of falls (and the associated hospital / healthcare costs)

3. Risk of malnutrition (and the associated hospital / healthcare costs

For the purposes of the economic modelling, it was determined that, at the end of the intervention, service users could end up in one of the three possible situations described below, reflecting whether the individual still needs help to carry out their daily activities and whether they are receiving any help:

- *Improved to the point of being able to complete daily activities without help.* In this case they would not require any care and support and that costs associated with this would therefore not be incurred. This group was considered to have a risk for falls and malnutrition below the population average (for people aged 65 and over).

- *Still need help carrying out daily activities and receiving help.* This help could come from a variety of sources, e.g. a homecare worker (state-funded or privately-funded), informal care and support (from spouses, family members, neighbours or friends) or a combination of both. This group was considered to have a greater risk for falls and malnutrition than the population average (for people aged 65 and over).

- *Still need help carrying out daily activities but not receiving help.* No associated care and support costs would be incurred. However this group would, because of their unmet care need, have a greater risk of experiencing falls and malnutrition than the other groups.

The model for the daily activities outcome at the beginning of the intervention is set out in Figure 1 below, and the model for the daily activities outcome at the end of the intervention is set out in Figure 2 below. Each model shows the probabilities of taking different pathways with regard to the daily activities outcome and the costs associated with each of these pathways. The total value of all costs incurred is calculated for each model with the difference representing the cost savings associated with improvements experienced in the ability to carry out daily activities over the course of the intervention. All the estimates used in the modelling of the daily activities outcome are set out in Table 1.

In the rest of the chapter, we discuss the modelling for the daily activities outcome, including the estimates that were selected for use in the model. Overall results (from the modelling of the daily activities and the subjective well-being outcomes) are reported in Chapter 9.

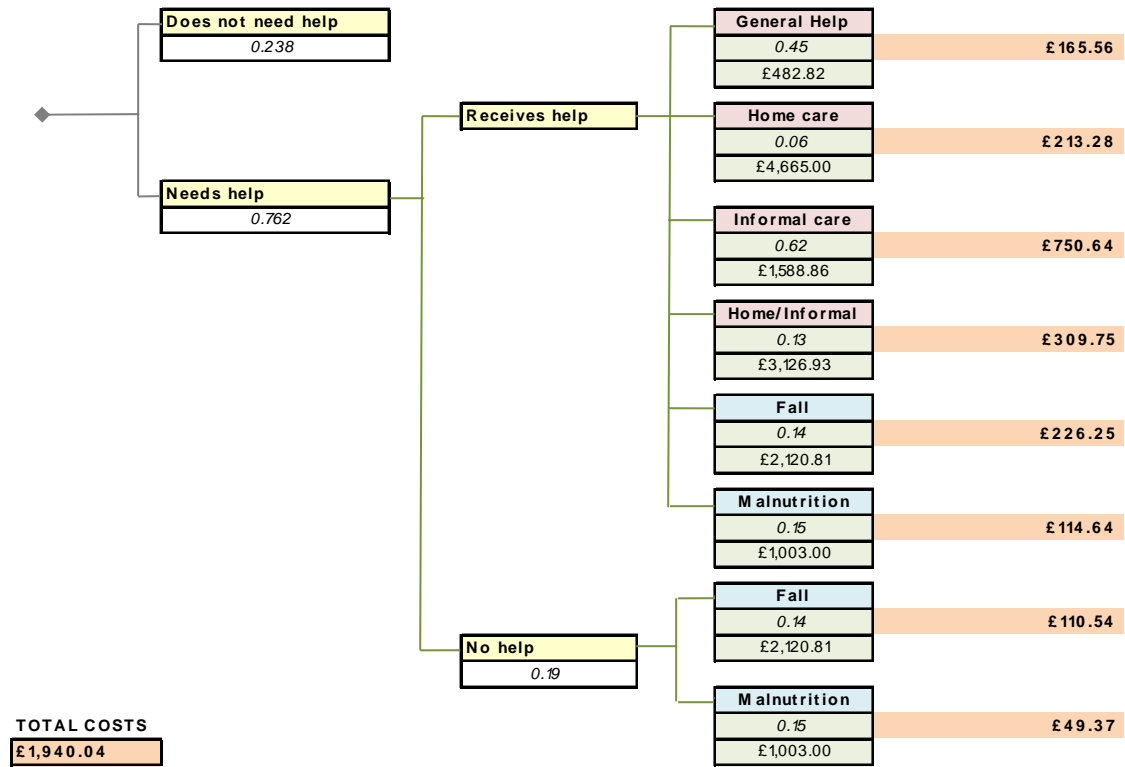### *Figure 1. Model for daily activities (at the beginning of the intervention)*

	General Help		
	0.45	£165.56	
	£482.82		
Receives help	**Home care**		
	0.06	£213.28	
	£4,665.00		
	Informal care		
	0.62	£750.64	
	£1,588.86		
	Home/Informal		
	0.13	£309.75	
	£3,126.93		
	Fall		
	0.14	£226.25	
	£2,120.81		
	Malnutrition		
	0.15	£114.64	
	£1,003.00		

Does not need help *0.238*

Needs help *0.762*

No help *0.19*

Fall		
0.14	£110.54	
£2,120.81		
Malnutrition		
0.15	£49.37	
£1,003.00		

TOTAL COSTS
£1,940.04

Figure 2. Model for daily activities (at the end of the intervention)

Does not need help *0.584*

Needs help *0.416*

General Help		
0.45	£90.38	
£482.82		
Home care		
0.06	£116.44	
£4,665.00		
Informal care		
0.62	£409.80	
£1,588.86		
Home/Informal		
0.13	£169.10	
£3,126.93		
Fall		
0.14	£123.52	
£2,120.81		
Malnutrition		
0.15	£62.59	
£1,003.00		

Receives help

No help *0.19*

Fall		
0.14	£60.35	
£2,120.81		
Malnutrition		
0.15	£26.95	
£1,003.00		

TOTAL COSTS
£1,059.13
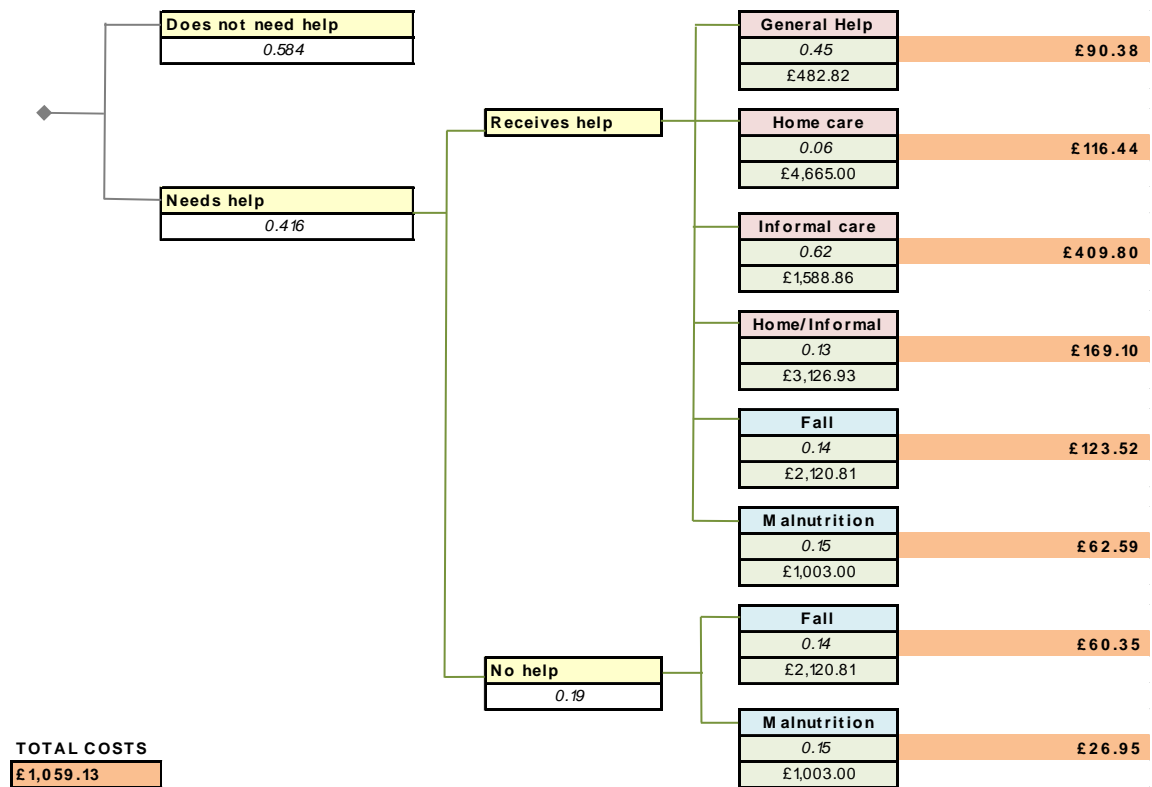
Table 1. Summary table of values used in daily activities model			
Parameter	*Value at beginning*	*Value at end*	*Source*
Whether need help with daily activities			
Needs help with one or more daily activities.	0.76	0.42	British Red Cross evaluation data
Does not need help with daily activities.	0.24	0.58	British Red Cross evaluation data
1. Care and support received (for those needing help with daily activities ONLY)			
1a. Homecare worker only (no informal care)	0.05	0.06	British Red Cross evaluation data
1b. Informal care only (no homecare worker)	0.62	0.45	British Red Cross evaluation data
1c. Both homecare worker and informal care	0.13	0.20	British Red Cross evaluation data
1d. General help (e.g. cleaner, gardener)	0.45	0.55	British Red Cross evaluation data
1e. No care and support (unmet care need).	0.19	0.30	British Red Cross evaluation data
2. Risk of falls			
2a. The risk of falling for those *who do not need* help with daily activities.	0.26	0.26	Srygley *et al.*, 2009
2b. The risk of falling for those *who need and receive* help with daily activities.	0.40	0.40	Hill *et al.*, 2011 Henry-Sanchez *et al.*, 2012 NICE, 2013
2c. The risk of falling for those *who need but do not receive* help with daily activities (have unmet care needs).	0.50	0.50	Based on estimates for vulnerable populations including NICE, 2013; Tiedemann *et al.*, 2013; Close *et al.*, 1999; Tchalla *et al.*, 2013; Tinetti *et al.*, 1994.

2d. Incremental risk of falling for those who need and receive help (relative to those who do not need help).	0.14	0.14	Hill *et al.*, 2011 Henry-Sanchez *et al.*, 2012 NICE, 2013
2e. Incremental risk of falling for those who *need but do not receive* help (relative to those who do not need help).	0.24	0.24	Based on estimates for vulnerable populations including NICE, 2013; Tiedemann *et al.*, 2013; Close *et al.*, 1999; Tchalla *et al.*, 2013; Tinetti *et al.*, 1994.
3. Risk of malnutrition			
3a. The risk of malnutrition **f**or those who *do not need* help with daily activities.	0.10	0.10	Based on Harris and Haboubi, 2005
3b. The risk of malnutrition for those who *need and receive* help with daily activities.	0.25	0.25	Based on Harris and Haboubi, 2005
3c. The risk of malnutrition for those *who need but do not receive* help with daily activities (i.e. have unmet care needs).	0.40	0.40	Based on Harris and Haboubi, 2005
3d. Incremental risk of malnutrition for those who *need and receive* help (relative to those who do not need help).	0.15	0.15	Based on Harris and Haboubi, 2005
3e. Incremental risk of malnutrition for those who *need help but do not receive* any help (relative to those who do not need help)	0.34	0.34	Based on Harris and Haboubi, 2005
4. Associated costs			
4a. Homecare worker (£18 per hour for average of 9.7 hours per week over 6 month period)	£4539	£4539	Curtis, 2011
4b. Informal care	£1561	£1561	UK Government minimum

(£6.19 per hour for average of 9.7 hours per week over 6 month period)			wage Based on Curtis, 2011 and Wanless, 2006
4c. Combination of homecare worker and informal care (£18 + £6.19 / 2 for an average of 9.7 hours per week over 6 months).	£3050	£3050	Curtis, 2011 UK Government minimum wage Estimates based on Curtis, 2011 and Wanless, 2006
4d. General help (cleaners, gardeners, etc.) (£6.16 per hour for average of 3 hours per week over 6 month period).	£480	£480	UK Government minimum wage
4e. Average cost of treating a fall, per incident.	£1060	£1060	NICE, 2010
4f. Incremental cost of services for those with malnutrition (relative to those without malnutrition).	£1003	£1003	Guest *et al.*, 2011

Secondary impact 1: Care and support needs and associated costs

The proportions of service users who needed help with daily activities, receiving different forms of care and support (homecare worker, informal care and general help), were taken directly from the British Red Cross evaluation.

The proportion receiving support from a homecare worker increased over the course of the intervention from 19 per cent at the beginning of the intervention to 25 per cent at the end of the intervention. The proportion receiving informal care, however, (from family, friends or neighbours) reduced from 75 per cent to 65 per cent over the course of the intervention. This may be explained by homecare workers taking on some elements of previously informally-provided care.

Breaking these figures down further, we find that, over the course of the intervention, of those that needed help with daily activities, the proportion in receipt of support from:

   a) *a homecare worker only* (receiving no informal care) reduced from 6 per cent to 5 per cent. (Table 1, row 1a.)

   b) *informal care only* (receiving no support from a homecare worker) reduced from 62 per cent to 45 per cent. (Table 1, row 1b.)

c) *a combination of informal care and support from a homecare worker* increased from 13 per cent to 20 per cent. (Table 1, row 1c.)

d) *general help* (e.g. a cleaner, gardener etc.) increased from 41 per cent to 55 per cent. (Table 1, row 1d.)

Homecare worker and associated costs

The cost of a homecare worker is valued at £18 per hour, which is the mean hourly cost of all homecare including local authority funded and independent provision (Curtis, 2012). The British Red Cross evaluation didn't set out to quantify the number of hours of homecare received by service users. For the modelling, therefore, the model uses an estimate derived from Curtis (2011 and 2012). The average number of hours of homecare received is given in Curtis (2011) as 12.4 hours per week and in Curtis (2012) it is 7 hours a week. Given the difference in these two figures, the research team opted to select the mean of these two figures, 9.7 hours. (Table 1, row 4a.)

Informal care and associated costs

The proportion of service users who need help with daily activities in receipt of informal care is 75 per cent at the beginning of the intervention and 65 per cent at the end of the intervention. This is broadly similar to national estimates. For example, Wittenberg *et al.* (2011) estimate that 76 per cent (1.9 million people) of the 2.5 million people aged over 65 who required assistance with at least one instrumental activity of daily living (IADL), or with one activity of daily living (ADL), were in receipt of informal care.

We also know that for the service users in the British Red Cross evaluation, informal care and support was provided predominantly by family carers (63 per cent before the intervention and 30 per cent after the intervention) with a further 31 per cent before the intervention and 35 per cent after the intervention saying they had help from friends and 31 per cent before the intervention and 25 per cent after the intervention also saying they received help from neighbours. This compares to national estimates of 18 per cent of care provided by spouses, 53 per cent provided by children or children-in-law, 21 per cent by friends and neighbours and 30 per cent by 'others' (Wanless, 2006).

The British Red Cross evaluation didn't set out to quantify the number of hours of informal care received by service users. The average amount of informal care was therefore estimated to be the same as the estimate for homecare (9.7 hours per week). This estimate is broadly supported by the analysis of the General Household Survey provided in Wanless (2006) that shows 78 per cent of all carers, and 89 per cent of carers who were not living with the person they cared for, provided between 0 and 19 hours of care per week. An opportunity cost approach was used to value informal care, in other words, what it is assumed the carer would be earning if they were not caring. This was conservatively set at the minimum wage of £6.19 per hour (Home Office, 2013). (Table 1, row 4b.)

Combination of homecare and informal care and associated costs

Formal and informal care are, of course, not mutually exclusive and 13 per cent of those needing help with daily activities reported receiving both formal and informal care at the beginning of the intervention with this figure increasing to 20 per cent by the end of the intervention. National

estimates of the proportion of older people receiving both formal and informal care vary. Breeze and Stafford (2008) report that 54 per cent of people aged 65 and over who are in receipt of privately-funded homecare, and 69 per cent of people aged 65 and over who are eligible for and access state-funded homecare, also receive informal care and support. However, in the *Survey of Carers in Households 2009/10*, published by the NHS Information Centre (2010), only 11 per cent of carers said that the person they cared for was visited by a home help or homecare worker.

For the purposes of modelling, a separate pathway for those receiving both homecare and informal care was created and the simplifying assumption that the cost for combined homecare and informal care was equivalent to the mean of the cost of homecare and the cost of informal care was made. (Table 1, row 4c.)

General help and associated costs

For the modelling, it was also necessary to attach a cost to general help, such as cleaners and gardeners. For this, it is assumed that a lesser amount of time is spent, an average of 3 hours per week, and provided at an average cost of £6.19, the national minimum wage rate. (Table 1, row 4d.)

Unmet care needs and associated costs

Some of the Support at Home service users who needed help with daily activities reported not receiving any help at all, either from family, friends or neighbours or from a homecare worker. This was the situation for 19 per cent of all users at the beginning of the intervention and 30 per cent at the end of the intervention. Consequently, no costs associated with the provision of care and support were incurred for these service users. According to Age UK (2013), of an estimated 2 million older people with care-related needs, 6,000 older people with high support needs, and 275,000 with less intensive needs, receive no care at all from state or informal sources.

Vlachantoni and colleagues (2011), in their study examining the concept of unmet need in a range of national surveys in the UK, point out that definitions of unmet need vary considerably and also that the concept is inherently textured with estimates of unmet need varying depending on what care need is being considered and with different combinations of care need. It is therefore not a simple matter to find a comparable national figure of unmet care need and Vlachantoni *et al.* (2011) report that estimates of unmet care need amongst people aged 65 and over vary between 15 and 61 per cent.

In one study, for example, Bien and colleagues (2013) interviewed family carers of people aged 65 and over in six European countries about the older person's service use and unmet need over a 6-month period. This study identified unmet need by asking whether the older person needed help with a range of activities and then, where a need for help was indicated, whether the respondent would like the older person to have more help with those activities. This captures the idea of a 'shortfall' in care and support, that is of having some but not enough help. Using this definition, Bien at al. found that, in the UK, around a third of people aged 65 and over had unmet needs for help with mobility (33 per cent) and personal needs (33.6 per cent), and over a quarter (29.8 per cent) reported unmet need for help with housework.

The British Red Cross evaluation identified service users who needed help but didn't get any, highlighting unmet need, but it didn't set out to identify service users with a shortfall in care and support. However, it is likely that some of the Support at Home service users who needed and were receiving help with daily activities will have experienced a shortfall in the amount of care and support they received. Forder (2007) estimates that, of the 2,450,000 people aged 65 and over with some form of disability or impairment, 18.4 per cent (450,000 people) experience an average shortfall of care and support of 3.1 hours per week. Factors that have been associated with unmet need include lower household income as well as living alone (Desai *et al.*, 2001). Tightening eligibility criteria for state-funded support and population ageing mean that the level of unmet care need may increase in future (Age UK, 2011).

Although, in the model, no care and support costs for those with unmet care need are incurred, this group is assumed to have an especially high risk of adverse events as a direct consequence of having unmet care needs (discussed further in the rest of this chapter). This group is also likely to experience a range of negative quality of life consequences that could not be included in the model.

Secondary impact 2: Risk of falls and associated costs

Risk of falls

Around one-third of all people aged 65 and over, living in the community, will experience at least one fall each year (Brannelly and Matthews, 2010, Gillespie, 2012; Tinetti, 1988; NICE, 2013) with this figure rising to around 50 per cent for people aged 80 and over (NICE, 2013). There are many different risk factors for falling with more than 400 factors identified in one systematic review of falls prevention strategies (Oliver, 2000). This diversity of risk factors means that it is difficult to identify groups of people who are at increased risk of falling (Oliver and Healey, 2009) and indicates a need for multi-factorial falls prevention strategies and individually tailored interventions (NICE, 2013).

However, we do know that Support at Home service users who need help with daily activities are likely to have a higher than average risk of falling, because they are known to have multiple risk factors (Tinetti, 1988; NICE, 2013). Some of the risk factors likely to be most relevant to Support at Home service users – functional decline, medications, health conditions and living alone - are discussed below.

For example, a number of studies have found that the risk of falling is associated with functional decline; in other words, a decline in the ability to carry out activities of daily living (NICE, 2013; Smee *et al.*, 2012; Hughes *et al.*, 2008). Functional decline is a key complication for older people when hospitalised. Some studies estimate that between 34 and 50 per cent of older patients will experience functional decline during a hospital stay, often for reasons unrelated to the condition for which they were admitted, and that there is a poor prognosis for functional recovery in these cases (Inouye *et al.*, 2000; Boyd *et al.*, 2008; Sager *et al.*, 1996).

Increased risk of falling for older people is also associated with taking specific medications (e.g. sedatives, benzodiazepines, psychotropics, arrhythmic medications, digoxin and diuretics) and with taking more than four medications irrespective of type (NICE, 2013; Todd *et al.*, 2004).

Risk of falls is also associated with a range of health conditions (e.g. circulatory disease, chronic obstructive pulmonary disease, depression, arthritis, thyroid dysfunction, diabetes, cognitive impairment, visual impairments, foot problems and lower extremity disability) as well as with having multiple chronic diseases (Todd *et al.*, 2004; Lawlor *et al.*, 2003, Tinetti *et al.*, 1994).

Furthermore, Support at Home service users are more likely than average to live alone whereby injuries and outcomes from falls can be worse, and especially if a person falls while alone and cannot get up afterwards (Todd *et al.*, 2004).

For those older people with unmet care needs, the risk of falling is even greater. Older people with unmet care needs are particularly vulnerable to a range of adverse events, including hospital admission and, compared to those in receipt of care, are likely to have an even higher risk of falling. In particular, unmet care needs can lead to poor self-care, poor diet, attempts to carry out tasks that cannot be carried out alone safely and difficulties administering medication, all of which can contribute to a range of health emergencies (Allen and Mor, 1997; Kuzuya *et al.*, 2008).

Studies have found that older people with unmet care needs have a higher likelihood of visiting accident and emergency services (Quail *et al.*, 2011) and of hospital re-admission (DePalma *et al.*, 2013) and that suitable care programmes can reduce this risk (Sands *et al.*, 2006). For example, Hill *et al.* (2011) found that for older people discharged from hospital who were in high-risk categories (such as those who had experienced a fall prior to hospitalisation and those who were depressed at discharge), receiving needed help with ADLs (defined as receiving help with showering or other personal care at a 6-month follow-up interview) significantly reduced the risk of falls, including injurious falls. In a further study, Desai *et al.* (2001) found that 20.7 per cent of older people had unmet care and support needs in relation to one or more activities of daily living (ADLs). Nearly half of these (47.6 per cent) experienced a specified negative consequence as a result including, for example, difficulty moving around the house.

For the purposes of the model, the PSSRU team drew on the literature to estimate the falls risk for three groups of service users.

   a) those not needing help with daily activities

   b) those needing help with daily activities and receiving care and support, and

   c) those needing help with daily activities but **not** receiving care and support

The estimates selected are approximate, as the team were unable to identify data sources for populations exactly matching these three groups of Support at Home service users. However, the literature does provide a range of estimates for populations of varying vulnerability, and we drew on these in order to estimate likely falls risk rates for these three groups.

Those not needing help with daily activities

We assumed that those who did not need help with daily activities had a risk of experiencing at least one fall of 0.26 (26 per cent), (Table 1, row 2a). This figure is taken from a US study by Srygley *et al.* (2009) in which a sample of healthy, community-living older adults, aged between 70 and 90 years, cognitively intact and able to walk independently, were monitored for falls over a period of a year. This is, as one would expect, less than the general population average of around 33 per cent (NICE, 2013).

The Support at Home service users who did not need help with daily activities were the least vulnerable in our sample. They are, however, likely to be somewhat more vulnerable than the sample in the Srygley *et al.* study on account of being recently discharged from hospital and being more likely to live alone. On the other hand, this is likely to be compensated for by the fact that the economic model in this study covers a 6-month period, whereas the Srygley *et al.* study estimate is for a year. Furthermore, in the Srygley *et al.* study, 9 per cent experience multiple falls over the course of the year, whereas we assumed that this group of service users experienced an average of one fall per faller over the 6-month period of the model.

Those needing help with daily activities and receiving care and support

Functional impairment has been found roughly to double the risk of falling (NICE, 2013). This suggests an overall falls risk of at least 0.5 (50 per cent) for those with ADL impairments. In one study, Hill *et al.* (2011) that found 40.2 per cent of older Australians, recently discharged from hospital, experienced at least one fall (an average of two falls per faller) over a 6-month period. In another study, based on a nationally representative sample of older Americans, Henry-Sanchez *et al.* (2012) found that 43.4 per cent of those with moderate and severe ADL disability experienced one or more falls over the course of a year.

Based on these figures, it was estimated that, for the purposes of the model, this group of Support at Home service users had a risk rate of 0.4 (40 per cent) over the 6-month period of our model. (Table 1, row 2b.) Drawing on Hill *et al.* (2011) it was further assumed that this group experienced an average of two falls in the 6-month period of the model.

Those needing help with daily activities but not receiving care and support

Finally, a range of estimates for particularly vulnerable populations were identified. For example, Tiedemann *et al.*, (2013) studied a population of older Australian people who experienced a fall and were attended to by the ambulance service but not transported to hospital. The researchers completed a baseline survey with these people and monitored them for six months after the fall. Over the course of six months, 58 per cent experienced at least one fall with an average of over three falls per person.

In the UK, Close *et al.* (1999) monitored older people attending an accident and emergency department following a fall and found that 52 per cent experienced at least one fall over a year following the initial accident and emergency attendance. In another study, Tchalla *et al.* (2013) found that in their sample of frail older people aged 65 years and over with mild to moderate Alzheimer's disease, as many as 63.8 per cent experienced at least one fall within a year.

In a further study, Tinetti *et al.* (1994) conducted a study involving people aged 70 years and older with at least one risk factor for falling, covering postural hypotension, use of sedatives, use of at

least four prescription medications, or impairments in either arm or leg strength, range of motion, balance, ability to transfer safely (e.g. from bed to chair) or gait. The researchers found that, over a year, 47 per cent experienced at least one fall.

More generally, older age groups have higher risk rates for falling with people over 80 years old having a risk rate of around 0.5 (50 per cent) (NICE, 2013).

Based on these figures, it was estimated that this group had a risk rate of 50 per cent. (Table 1, row 2c.) Drawing on Tiedemann *et al.* (2013), we assumed that this group of service users experienced an average of three falls per faller over the 6-month period of the model.

Impacts and costs of falls

Falls can have a range of serious consequences for older people. In a study carried out as part of the Longitudinal Aging Study Amsterdam, Stel *et al.* (2004) found that of all falls experienced by people aged 65 and over, 68.1 per cent led to some form of physical injury and 23.5 per cent of people consulted a health practitioner with 7.9 per cent of people making a hospital visit. Medical treatment was needed in 17.2 per cent of cases with 1.5 per cent requiring surgery. Respondents in the study also reported a decline in functional status (35.3 per cent), a decline in social activities outside the house (16.7 per cent) and physical activities (15.2 per cent) as a direct consequence of a fall.

For those experiencing a fall, we know that 3.24 per cent are likely to sustain a hip fracture (NICE, 2013). Half of all people experiencing a hip fracture never regain their previous levels of functional ability and one in five dies within three months (Stevens and Olson, 2000). A reported 8.6 per cent of hospital inpatients with hip fracture, between the ages of 70–74, also require long-term residential care placements with this number rising to 27 per cent for those aged 75 and over (Scuffham *et al.*, 2003).

The economic modelling for this study focuses on treatment costs and draws cost estimates from NICE (2010). Iglesias at al. (2009) explored the cost implications of falls in a sample of 1190 women aged 70 and over (mean age 76.8 years) who were taking part in a randomised controlled trial of calcium and vitamin D treatment. The National Institute for Clinical Excellence (NICE) in *Costing Statement: Diagnosis, Prevention and Management of Delirium* (2010) draws on this study and estimates a weighted average cost of NHS hospital treatment for all falls of £1027 per incident (£1060 in 2012 prices). This average cost encompasses a range of costs, including the particularly high treatment costs associated with hip fractures (£5334) and other fractures (£2660). (Table 1, row 4e.)

Secondary impact 3: Risk of malnutrition and associated costs

Risk of malnutrition

We know that an estimated 93 per cent of people aged 65 and over, who are malnourished or at risk of malnutrition, live in the community with the remainder resident in care homes or hospital (Advisory Group on Malnutrition, British Association for Parenteral and Enteral Nutrition, 2009). Estimates for the proportion of people in the general population aged 65 and over who are suffering from malnutrition range from 10 per cent (European Nutrition for Health Alliance, British Association for Parenteral and Enteral Nutrition and International Longevity Centre UK, 2006) to 12 per cent (Harris and Haboubi, 2005) and 14 per cent (APSE, 2007).

However, vulnerable populations have a much higher risk of being malnourished. Older people, particularly those who are hospitalised or living in care homes, people on low incomes, those who are socially isolated, people with chronic disorders and those recovering from a serious illness or condition are particularly susceptible to malnutrition (Guest *et al.*, 2011). The Malnutrition Task Force (2013), for example, estimate that 33 per cent of over 65 year olds admitted to hospital have malnutrition while Harris and Haboubi (2005) estimate this figure to be as high as 40 per cent.

Support at Home service users are likely to be a more vulnerable group, because of being recently discharged from hospital and because a higher than average number of them live alone. Those who have unmet care and support needs are likely to have an even higher risk of being malnourished.

Based on these figures we estimate the following risk rates:

a) For those not needing help with daily activities, we assume a rate of 10 per cent. (Table 1, row 3a.)

b) For those needing help with daily activities, we assume a rate of 25 per cent. (Table 1, row 3b.)

c) For those needing help with daily activities and having unmet care needs, we assume a rate of 40 per cent. (Table 1, row 3c.)

Costs of malnutrition

We take the costs for malnutrition from Guest *et al.* (2011) who compared the health use of a sample of around 1000 people (mean age 63) who were diagnosed with malnutrition with a matched sample and found that older people who were malnourished had accessed their GP twice as often, were admitted to hospital three times more frequently and had stays upwards of three days longer than well-nourished older people over a 6-month period. The malnourished patients' average expenditure for health care services over a 6-month period, at £1,753, was more than double than that of a non-malnourished patient, at £750. This provides an incremental cost of £1003.

Attaching economic value to the subjective well-being outcome

The questions asked in the British Red Cross evaluation (Joy *et al.*, 2013) about subjective well-being were*:*

> *Could you indicate for me using the scoring system on this card how much you agree or disagree with the following statements?'*
>
> *[scores from 1 'strongly disagree' to 5 'strongly agree']*
>
> *1. I feel in good spirits*
>
> *2. I feel good about myself*

Statistically significant improvements against this outcome were identified with services users gaining, over the period of the intervention, improved subjective well-being. The mean response prior to receiving the services (at baseline) was 3.51 and 3.87 at follow-up (t=-2.38, p < 0.05).

Service users giving responses of 1 or 2 to at least one of the subjective well-being questions were grouped and classified as having poor well-being. At the beginning of the Support at Home intervention, 32 per cent of service users had poor subjective well-being, reducing to 16 per cent by the end of the intervention.

Secondary impacts for 'subjective well-being' – identifying the associated costs

For the modelling, the subjective well-being outcome was considered to be an indicator of an increased risk for depressive symptoms, with links made to the costs of treating depression (Reid *et al.*, 2006; Diener *et al.*, 2009). For the model it was determined that, at the end of the intervention, service users would be in one of two possible situations:

- With poor subjective well-being and with a higher than average risk of depressive symptoms.

- With good subjective well-being and a lower than average risk of depressive symptoms.

The model for the subjective well-being outcome is set out in Figure 3 (before the intervention) and Figure 4 (at the end of the intervention).

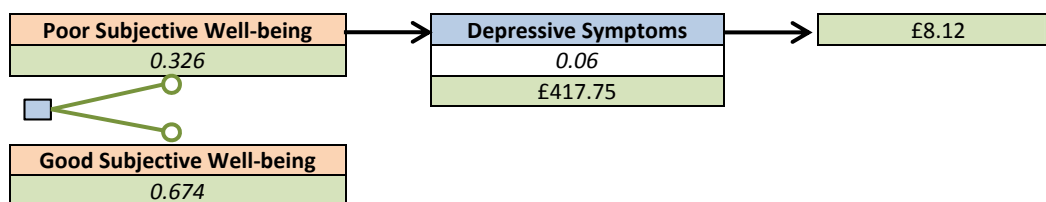*Figure 3: Model for subjective well-being (before the intervention)*

Poor Subjective Well-being	Depressive Symptoms	£8.12
0.326	*0.06*	
	£417.75	

Good Subjective Well-being
0.674

Figure 4: Model for subjective well-being (at the end of the intervention)

Poor Subjective Well-being	Depressive Symptoms	£3.99
0.16	*0.06*	
	£415.17	

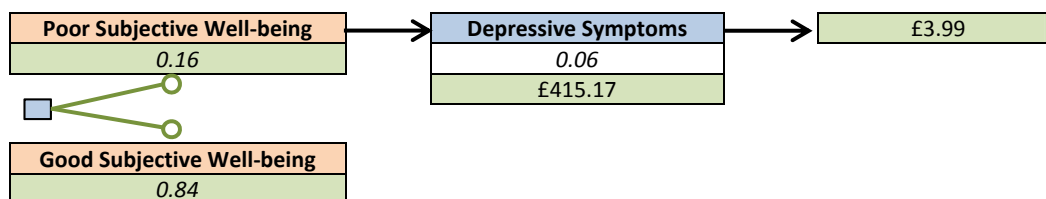| Good Subjective Well-being |
|---|
| *0.84* |

Table 2 includes all the parameter estimates used in the model for subjective well-being. The modelling and estimates used are discussed further in the remainder of this section.

Table 2: Summary table of values used in subjective well-being model

Parameter	Value at beginning	Value at end	Source
a. Poor subjective well-being	0.326	0.16	British Red Cross evaluation data
b. Good subjective well-being	0.674	0.84	British Red Cross evaluation data
c. Higher risk of depressive symptoms	0.193	0.193	Reid *et al.* (2006)
d. Lower risk of depressive symptoms	0.133	0.133	Reid *et al.* (2006)
e. Incremental risk of depressive symptoms	0.06	0.06	Reid *et al.* (2006)
f. Cost for treatment for depression	£415	£415	NICE/SCIE, 2006b

Depressive symptoms and associated costs

Risk of depressive symptoms

Subjective well-being is a multi-faceted construct and there is no consensus on a single definition in the literature. Measures of subjective well-being differ from objective measures of well-being (e.g. income). Data are necessarily gathered using self-report and they focus on well-being from the perspective of the individual allowing for differences between individuals in the weighting of the many factors in life that contribute towards well-being. Despite there being no single definition, there is general agreement that subjective well-being includes the presence of positive emotions and moods (e.g., contentment, happiness), the absence of negative emotions (e.g., depression, anxiety), satisfaction with life, fulfilment and positive functioning. For public health purposes, physical well-being (e.g. feeling healthy, having energy) is also likely to be important.

The British Red Cross evaluation's measure of subjective well-being consists of a self-esteem measure and a measure of positive mood. The definition used by NICE in their guidance on mental well-being and older people (2008) is broader and combines concepts such as life satisfaction, optimism, self-esteem, mastery and feeling in control, having a purpose in life and a sense of belonging and support. The English Longitudinal Study of Ageing (Banks et al, 2010) also includes the dimensions of depression and loneliness.

For the purposes of the economic modelling, subjective well-being is considered as an indicator of depression. Around a quarter of people aged 65 and over are estimated to have depressive symptoms (Graham *et al.*, 2011; Age UK, 2013). Depression is found to be correlated with more common well-being measures such as life satisfaction judgements (Diener, 2009; Wood and Joseph, 2010, Schimmack *et al.*, 2004; Ryff and Keyes, 1995; Cummins *et al.*, 2007; Gargiulo *et al.*, 2009; Alpass and Neville, 2003).

The economic model drew on findings from a US-based study carried out by Reid *et al.* (2006). Reid and colleagues gathered data from 2317 men and women with hypertension and coronary artery disease (average age 67 years) and then monitored for adverse clinical events for a year following the baseline medical interviews and survey. The aim of the study was to explore whether a single measure of subjective well-being could help identify patients at high risk for adverse clinical outcomes, including depressive symptoms. At the beginning of the study, respondents were asked whether their overall feeling of well-being during the past month was excellent, good, fair, or poor. Depressive symptoms were measured in the baseline survey using the Center for Epidemiologic Studies-Depression (CES-D) scale. The study found depressive symptoms in 8.6 per cent (n=192) of those with excellent subjective well-being, 14.2 per cent (n=1028) of those with good subjective well-being, 19.1 per cent (n=327) of those with fair subjective well-being, and 21.2 per cent (n=31) of those with poor subjective well-being.

Following Reid *et al.*, the PSSRU team pooled excellent/good and fair/poor subjective well-being to establish two groups with differential risk for depressive symptoms. We then allocated these different levels of risk of having depressive symptoms to the two sub-groups in the Support at home sample, those with good subjective well-being and those with poor well-being. The proportion of

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those with depressive symptoms for the combined excellent/ good subjective well-being category was 13.3 per cent - the calculation for this was (8.6*192)+(14.2*1028)/ 1220. This provides a risk of 0.133. (Table 2, row d.) For the fair/ poor subjective well-being category it was 19.3 per cent -the calculation for this was (19.1*327)+ (21.2*31)/ 358. This provides a risk of 0.193. (Table 2, row c.) For the purposes of the model it was assumed that all of those with depressive symptoms would receive treatment.

Costs of depression

Costs for treatment for depression are taken from NICE/SCIE, 2006, where it is assumed that 36 per cent of carers with depression will have mild depression and will require a mixture of self-help (costed at £38 per intervention, 2006 prices) and short-term psychological therapy (costed at £188 per intervention, 2006 prices). The remainder will have moderate or severe depression and will receive cognitive behavioural therapy (CBT) (costed at £488). This produces an average intervention cost of £363. Adjusted for 2012 prices, this is £415. (Table 2, row f.)

Results

Taking the models for both outcomes together, we find that for the sample of 52 people in the British Red Cross evaluation (Joy *et al.*, 2013), the total savings associated with a reduction in the need for help with daily activities and improvements in subjective well-being was £45,810, the equivalent of £880 per person[2]. This figure is made up of the following.

Homecare workers: Saved costs of £8692 (£167 per person)
In order to estimate the proportion of this homecare that is likely to have been funded by the state and that is likely to have been funded privately, the PSSRU team took figures from national sources. The Health and Social Care Information Centre (2013) reports that 384,235 people aged 65 and over receive publicly arranged homecare with a further 64,780 people in receipt of direct payments. This is a total of 449,015 older people that receive state-funded care and support. The Institute of Public Care, Oxford Brookes University (2011) estimate that there are a further 168,701 people aged 65 and over in England who self fund. This gives a ratio of around 3:1 state-funded to privately funded care. Consequently, we estimate that £6,518 (£125 per person) of these savings fall to the public purse and the remaining £2,172 (£42 per person) fall to individuals in the form of out of pocket expenses.

Informal care: Saved costs of £21,380 (£411 per person)
The costs of informal care would fall to private individuals in the form of an opportunity cost.

General help: Saved costs of £3909 (£75 per person)
These costs would fall to private individuals in the form of out of pocket expenses.

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[2] Figures may not sum accurately due to rounding.

Health care: Saved costs associated with falls and malnutrition and treating depression of £11,824 (£227 per person)

Of these, £7952 (£153 per person) is associated with the treatment of falls in secondary care settings. Costs associated with malnutrition come to (£3872, £74 per person), which include a range of health costs; 34 per cent are for GP appointments, 24 per cent are for prescriptions, 19 per cent are for hospital admissions, 12 per cent are for medical devices with the remaining 11 per cent covering community services such as dietician and practice nurse visits, medical tests and diagnostic procedures, therapeutic medical procedures and ambulance transport (Guest *et al.*, 2011). Health costs associated with depressive symptoms are £215 (£4.14 per person) and cover cognitive behavioural therapy, as well an individual psychological therapy and self-help, manual-based approaches.

Overall, this means that of all the identified savings (£45,810, £880 per person), a total of £18,348 (£352 per person) of these costs would fall to the public purse while £6082 (£117 per person) would fall to private individuals in the form of out of pocket expenses and £21,380 (£411 per person) in the form of opportunity costs.

Since the Support at Home intervention costs £169 per person and identified savings associated with improvements in capacity to carry out daily activities and subjective well being come to £880 per person, the Support at Home intervention would need to be responsible for 19 per cent of these observed improvements to be considered cost-effective (on the basis of identified savings)[3].

Conclusions and discussion

The economic evaluation estimated the cost savings associated with observed improvements in two of the outcomes that were statistically significant in the British Red Cross evaluation (Joy *et al.*, 2013). These were service users' 'ability to carry out daily activities' and 'subjective well-being'. These savings came to an average £880 per service user, a figure we believe is likely to be conservative.[4]

We do not know what proportion of the identified savings can be attributed to the Support at Home intervention, as we do not have a measure of how much of the observed improvements might be expected in the absence of the intervention. If we compare the total identified cost savings (£880) with the cost of the intervention (£169 per person), we find that the intervention would need to be

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[3] It is worth noting that, if instead we had calculated the intervention cost using median gross hourly earnings, rather than minimum wage, to estimate the costs of volunteer time this would make the cost of the intervention £203 per service user, in which case the Support at home intervention would need to be responsible for 23 per cent of observed improvements.

[4] As well as using conservative estimates throughout, the definition of unmet need used by the British Red Cross in their evaluation is of needing help but receiving no help at all, a conservative definition that disregards any short fall in care. Informal care is also valued conservatively at the minimum wage level.

responsible for at least 19 per cent of these observed improvements before it could be considered cost-saving (on the basis of identified cost savings). On the basis of available data, we cannot say whether or not this is likely. However, at £169 per person, the intervention can be considered a low cost one.

The economic analysis looked only at improvements in the ability to carry out daily activities and in subjective well-being. It may be that service users experienced other positive outcomes but the small sample sizes in the British Red Cross evaluation may have meant that they were not found to be statistically significant. It is also the case that benefits and areas of potential cost saving in multi-component interventions of this sort may be diffuse, making benefits difficult to identify and measure. The qualitative research, conducted as part of the British Red Cross evaluation, also indicated that there were wider benefits, including enabling safe discharge, supporting carers and enabling patient advocacy. A lack of quantitative data meant that these also could not be included in the economic model.

Furthermore, the initiative is likely to have delivered a range of quality of life benefits. There are a limited number of quality of life measures capable of being used in economic analysis. The commonly used EQ-5D measure is a health-focused measure. However, the British Red Cross intervention aspires only to influence some of these outcomes. EQ-5D may also omit some aspects of QoL that are important to participants (e.g. feeling safe). Other measures, more appropriate to social care interventions, can be relatively long and complex to administer (e.g. ASCOT). However, the British Red Cross evaluation shows that following discharge, over the course of the intervention, service users experienced improvements in their ability to perform daily activities and in their subjective well-being, which are highly likely to be associated with quality of life benefits. Quality of life benefits are also indicated in qualitative evidence from the British Red Cross evaluation. For example, people spoke about how much they valued having someone to talk to and knowing someone is thinking about them. This helped to alleviate worries and reduce people's sense of isolation. People also spoke of the reassurance of having someone to turn to at a point of crisis.

In summary, economic evaluation in this area is challenging. It can be hard to identify an appropriate control group or matched sample and standardized measures for some of the outcomes relevant in multi-component initiatives of this sort, including quality of life measures, can be limited in their relevance or time-consuming and difficult to administer in a short interview. Outcomes are also likely to be multiple and impacts may be diffuse. These challenges are reflected in the limited evidence base for initiatives of this sort.

More generally, in this area of research, there remain outstanding questions about which types of interventions or activities are most beneficial and which clients are likely to receive the greatest benefit. For example, Stuck *et al.* (2002) remark that 'a subgroup analysis of a trial of home visitation program suggested that older people with relatively good functional status at baseline were more likely to benefit.' (p. 1022). Future research should also consider the extent to which services are tailored to the individual and how this can be done (Cornes and Manthorpe, 2004; McLeod *et al.*, 2008). Further research is also required on the appropriate intensity and duration of these kinds of interventions. It has, for example, been observed in some previous research that the six to eight week average duration of intermediate care interventions is too brief for the individuals to regain an

adequate level of independence (Cornes and Manthorpe, 2004; McLeod *et al.*, 2008). Finally, more research is also needed into the possible long-term outcomes (NICE, 2008).

In this context, it is not possible to say whether the Support in the Home service is cost-effective. However, this study has attempted to identify possible sources of cost savings associated with outcomes that we know are experienced by Support in the Home service users and which the Support in the Home service aims to influence. Where possible, these have been quantified and included in an economic model. This study has also identified the costs of providing the Support in the Home service, showing it to be a low cost service, and has quantified the level of responsibility for identified savings that would be needed to justify these costs. However, we also know that the estimate of total cost-savings and benefits is likely to be conservative, since it was not possible to include a range of potential savings and benefits in the model, including quality of life benefits.

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