



Deposited via The University of York.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/id/eprint/202107/>

Version: Published Version

---

**Article:**

Longo, Francesco, Claxton, Karl, Lomas, James et al. (2023) Is extending eligibility for adult social care better than investing more in existing users in England?:A cross-sectional evidence for multiple financial years. *BMJ Open*. e070833. ISSN: 2044-6055

<https://doi.org/10.1136/bmjopen-2022-070833>

---



**Reuse**

This article is distributed under the terms of the Creative Commons Attribution-NonCommercial (CC BY-NC) licence. This licence allows you to remix, tweak, and build upon this work non-commercially, and any new works must also acknowledge the authors and be non-commercial. You don't have to license any derivative works on the same terms. More information and the full terms of the licence here:  
<https://creativecommons.org/licenses/>

**Takedown**

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing [eprints@whiterose.ac.uk](mailto:eprints@whiterose.ac.uk) including the URL of the record and the reason for the withdrawal request.

# BMJ Open Is extending eligibility for adult social care better than investing more in existing users in England? A cross-sectional evidence for multiple financial years

Francesco Longo <sup>1</sup>, Karl Claxton,<sup>1</sup> James Lomas <sup>2</sup>, Stephen Martin<sup>2</sup>

**To cite:** Longo F, Claxton K, Lomas J, *et al.* Is extending eligibility for adult social care better than investing more in existing users in England? A cross-sectional evidence for multiple financial years. *BMJ Open* 2023;**13**:e070833. doi:10.1136/bmjopen-2022-070833

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-070833>).

SM died on June 2022.

Received 06 December 2022  
Accepted 02 August 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

<sup>1</sup>Centre for Health Economics, University of York, York, UK

<sup>2</sup>Department of Economics and Related Studies, University of York, York, UK

## Correspondence to

Dr Francesco Longo;  
[Francesco.Longo@york.ac.uk](mailto:Francesco.Longo@york.ac.uk)

## ABSTRACT

**Objectives** Publicly funded adult social care (ASC) in England aims to improve quality of life through the provision of services for individuals with care needs due to physical and/or mental impairment or illness. Access to these services, however, is often restricted to contain public expenditure. With a fast-growing care need, information on whether extending eligibility is good value for money becomes policy-relevant.

**Primary and secondary outcome measures** This study investigates the effect of extending ASC eligibility on user care-related quality of life (CRQoL), a policy-relevant measure of quality of life.

**Design** We use English cross-sectional survey data from 2017/2018 to 2019/2020 on users receiving publicly funded long-term support including domiciliary and other community-based social care, as well as residential and nursing care from local authorities responsible for ASC. We employ the two-stage least square method to estimate the impact of ASC expenditure on CRQoL at various levels of ASC expenditure in each financial year. This includes the CRQoL effect of increasing expenditure from zero to some level, which captures the effect of extending ASC eligibility to new users.

**Results** We find that publicly funded ASC improves the CRQoL of both existing and newly eligible users, although the latter are likely to experience greater CRQoL gains. Moreover, from 2017/2018 to 2019/2020, spending as much as an average user for a newly eligible user costs between £54 224 and £77 778 per social care-quality-adjusted life year (SC-QALY) gained. These results are statistically significant at the 5% level. Compared with this finding, increasing expenditure for an existing user has always a higher cost per SC-QALY gained.

**Conclusions** Extending ASC eligibility to new users is likely to be more cost-effective compared with using the same resources to increase expenditure for existing users.

## INTRODUCTION

Adult social care (ASC) is the public long-term care programme in England and spending in this sector is significant—about 1% of Gross Domestic Product on average in the last two decades. ASC provides services to

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ We estimate the causal impact of publicly funded adult social care expenditure on the care-related quality of life (CRQoL) of newly eligible users in addition to existing users.
- ⇒ Causal inference is made across multiple financial years.
- ⇒ Our analysis focuses on individuals receiving long-term support who are those with the highest level of need in the population and results might not apply to individuals with lower levels of need.
- ⇒ The effects of extending ASC eligibility on CRQoL is estimated by extrapolation because our sample mostly includes users receiving publicly funded support.

individuals with care needs due to physical and/or mental impairment or illness. These services range from long-term support (eg, domiciliary care, residential care) to signposting and information services, and they have the goal of improving the quality of life of service users.<sup>1</sup> The financial challenges of the last decades placed ASC under a substantial pressure with expenditure decreasing in real terms in the first half of the 2010s. The cost containment measures implemented by the government in this period exacerbated the gap between demand and supply of ASC services. This meant that 40% fewer individuals aged 65 and over received ASC leaving them with less support.<sup>2,3</sup> In response to these issues, in September 2021, the UK Government announced an investment of £5.4 billion in ASC in England. One of the key aims of this plan was to extend the eligibility for ASC services through less stringent financial eligibility criteria (see the ASC in England section for more details).<sup>4</sup> This decision was made in a context where satisfaction with current ASC services is low and



decreasing over time.<sup>5,6</sup> Therefore, one possible trade-off that decision makers face is between investing more in services for existing users and extending the eligibility for services to new users.

However, there exists little empirical evidence that can inform this decision. Forder *et al*<sup>7</sup> investigate the effect of privately and publicly funded community-based social care (eg, domiciliary care, day care) on care-related quality of life (CRQoL), a policy-relevant outcome measure. The authors analyse cross-sectional data and find a beneficial effect of expenditure on community-based social care services, but these CRQoL benefits diminish with increased level of expenditure. These findings suggest that policies aiming to maximise the impact on CRQoL should invest in extending eligibility to new users rather than in existing users. The focus of this study, however, is relatively narrow because, for example, in 2019/2020, ASC expenditure on community-based services is on average 35% of total ASC expenditure across local authorities (LAs). Moreover, the estimated CRQoL effects are attributable to both privately and publicly funded services. Therefore, this study provides only a partial picture to national and local policy makers of how any additional public expenditure on ASC might be best spent. On the other hand, a more recent study by Longo *et al*<sup>8</sup> investigates the CRQoL effects of public expenditure on all ASC services. The authors estimate the effect of ASC expenditure per user on CRQoL also using cross-sectional data. They find that a £1000 increase in ASC expenditure per user increases user CRQoL by 0.003 (0.4% of the average user CRQoL) in 2017/2018. This effect, however, is best interpreted as the CRQoL effect of an increase in expenditure for an existing user receiving an average ASC package. Therefore, this study does not allow considerations of the cost-effectiveness of extending ASC eligibility.

The present study fills this gap. We investigate whether an investment in extending eligibility would provide better value compared with the same resources devoted to existing users already receiving ASC services. This is not trivial because the cost-effectiveness of these two decisions depends on the nature of the relationship between ASC expenditure and its relevant outcomes. Economic theory suggests that diminishing marginal returns may be expected in a range of contexts, but whether and to what extent the effect on CRQoL of ASC expenditure diminish as the level of expenditure increases is an unanswered empirical question. Therefore, we address this by employing an econometric model that builds on the method proposed by Longo *et al*.<sup>8</sup> This allows us to characterise the relationship between CRQoL and ASC expenditure, and to inform value-for-money considerations in terms of the policy-relevant social care-quality-adjusted life year (SC-QALY). The next section describes ASC in England, and the following section on methods introduces data (Data) and empirical models (Econometric models). Section Results illustrates the results, Section

Discussion discusses them, including limitations (Study limitations) and Section Conclusion concludes.

### ASC in England

ASC in England is provided by 152 LAs by directly supplying services, or by contracting with private and not-for-profit providers. ASC services include: long-term support (eg, community-based, residential and nursing care) which aims to support users over an unspecified although not necessarily long period of time (eg, at the end of life); short-term support, which is time-limited, aiming to maximise independence to reduce the need for long-term support (eg, reablement), one-off services such as assistive equipment (eg, smoke alarm for hearing impaired users), adaptations (eg, shower chair for disabled users) and technologies (eg, to deliver telecare); information and early intervention services to inform and signpost potential and existing users; and auxiliary ASC activities such as front-line assessment and review of users.<sup>9</sup> Users of long-term support, on which we focus, may receive all these ASC services and, therefore, we study the effect of total ASC expenditure on these users. Total expenditure also includes the costs of commissioning and delivering services (eg, strategic business direction, business planning).

The Care Act 2014 sets out minimum levels of care services, most of which are means-tested based on need and finances. Currently, means-tested ASC is provided free of charge to users with sufficiently high need, assets below £14 250, and income below a certain minimum level. Users copay for public ASC services if they meet the needs eligibility criteria but their assets are between £14 250 and £23 250, or if their income is above a certain minimum level. Regardless of their needs, however, individuals are ineligible for publicly funded ASC services if their assets are above £23 250. In the assessment of the eligibility for residential or nursing care both savings and property's value are considered 'assets', while only savings are taken into account for community-based social care. However, in September 2021, the government announced a new ASC charging reform which aims to extend eligibility through less stringent financial eligibility criteria from October 2025.<sup>4,10</sup> The reform means that the level of assets, including both savings and property's value, which allows users to receive ASC that is at least partially publicly funded increases from £23 250 to £100 000. The new criteria apply to all users regardless of their care setting. The reform also sets the maximum lifetime amount any individuals will be required to contribute towards their care costs at £86 000.

LAs fund ASC for those that meet the eligibility criteria mostly through revenues from local taxation and grants from central government.<sup>11,12</sup> Among local taxes, council tax on domestic properties represents the key source of ASC funding. Although to a lesser extent, other ASC funding comes from business rates tax on non-domestic properties. The central government also provides a substantial proportion of funding to LAs through grants.

Grants that are ring-fenced for ASC are distributed across LAs according to a formula which takes account of local social care need and labour costs.

## METHODS

### Data

Our main analysis uses data from various sources in the public domain for three financial years: 2017/2018, 2018/2019 and 2019/2020. Data on CRQoL and the characteristics of ASC users receiving long-term support are from the Adult Social Care Survey (ASCS). Data on total (publicly funded) ASC expenditure and number of users across LAs are from the Adult Social Care-Finance Return and Short and Long Term Support databases, respectively. Other LA-level data about disability, tenure, socioeconomic status and informal unpaid carers are from various sources which are included in online supplemental appendix table A1. [Tables 1 and 2](#) provide descriptive statistics on all variables used in the analyses for each financial year.

### Adult Social Care Survey

The ASCS is our primary source of data from which we construct variables for user CRQoL and characteristics. This is a cross-sectional survey administered by post every year from January to March since 2010/2011. The ASCS questionnaire includes questions about service satisfaction, quality of life, service knowledge and information, health, needs in relation to home and surroundings, and help received on top of LA services. Quality of life measures include the Adult Social Care Outcome Toolkit (ASCOT), a validated tool recommended by the National Institute for Health and Care Excellence in the UK for the evaluation of ASC interventions. We use ASCOT to calculate a CRQoL score for each user that reflects population preferences about various aspects of quality of life (eg, control over daily life, personal safety, social participation).<sup>13</sup> The CRQoL score varies between 1 and -0.171, where negative values indicate states worse than dead. The target population of this survey includes users aged 18 or older receiving long-term support that is funded and managed or only managed by the LA following an assessment of need. The ASCS uses a stratified random sample that is representative of the target population.<sup>14</sup> The ASCS response rate has a declining trend from 41% in 2010/2011 to 29% in 2019/2020 meaning that the risk of sample bias increases over time. Nonetheless, the ASCS is recommended for the evaluation of local and national policies, and it is currently used for performance monitoring and research purposes.<sup>15 16</sup>

### Econometric models

Longo *et al*<sup>8</sup> estimate the effect of publicly funded ASC expenditure per user on CRQoL of existing users across LAs in 2017/2018 through the following equation:

$$\text{CRQoL}_{i,j} = f(\text{ASC expenditure}_{i,j}) + \text{LA type}_{i,j} + \text{controls}_{i,j} + \text{error}_{i,j} \quad (1)$$

In equation (1), the CRQoL of user *i* living in LA *j* is assumed to be a linear function *f* of ASC expenditure per user. To capture eligibility levels we use a dummy variable for each type of LA. The eligibility policy has been argued to vary systematically by type of LA because of factors such as innate culture and market conditions.<sup>17</sup> There are four types of LAs responsible for ASC including unitary, metropolitan and county LAs, and London boroughs (inner and outer). Unitary and metropolitan LAs are responsible for more local services compared with county LAs and London boroughs. The control variables capture user and informal unpaid carer characteristics and LA characteristics such as disability, tenure and socioeconomic status. The error includes any other factor which is an unobserved determinant of CRQoL (eg, unobserved need).

Estimating the impact of ASC expenditure per user on CRQoL is challenging because, first, lower outcomes may induce LAs to spend more (reverse causation) and second, expenditure level may be correlated with unobserved need (confounding). In the presence of these issues, ASC expenditure per user is endogenous which implies that ordinary least square estimates are likely to be biased and inconsistent. The authors address this problem by employing an instrumental variable (IV) approach. This consists of finding a variable, the instrument, which is a good predictor of ASC expenditure per user (relevance condition) but has no direct effect on CRQoL and is uncorrelated with unobserved determinants of CRQoL (exogeneity condition). Estimating the relationship between levels of expenditure, predicted by the instrument and other control variables, and CRQoL can identify an unbiased and causal effect. This method is called the two-stage least squares (2SLS) estimator. The authors use the council tax base per user as the primary instrument. The council tax base captures the number and past sale value of all domestic properties within each LA. Since council tax is a major source of ASC funding, this instrument is a good predictor of ASC expenditure. Moreover, once socioeconomic characteristics are accounted for, the council tax base is unlikely to be directly related to current social care outcomes and needs. It is, however, likely to be related to CRQoL only indirectly via its effect on council tax revenues and, in turn, ASC expenditure.<sup>8</sup>

Regression (1) estimates the causal effect of an increase in ASC expenditure per user on user CRQoL. For given eligibility levels, this effect is best interpreted as the CRQoL effect of an increase in expenditure for an existing user receiving an average ASC package. This is because (1) estimates a linear relationship between ASC expenditure per user and CRQoL using data only on users receiving long-term support. Therefore, the assumption that this effect is the same at all levels of ASC expenditure per user, including at zero expenditure (ie, for potentially newly eligible users), is likely to be invalid. A more likely scenario is that of diminishing marginal returns, where the effect of ASC expenditure on CRQoL decreases as the level of expenditure increases.

**Table 1** Descriptive statistics on user-level data

Variable at the user level	2017/2018		2018/2019		2019/2020	
	Mean	SD	Mean	SD	Mean	SD
Outcome						
Care-related quality of life	0.824	0.191	0.823	0.191	0.824	0.194
Gender						
Male user (ref)	41.9%	0.493	42.3%	0.494	42.7%	0.495
Female user	58.1%	0.493	57.7%	0.494	57.3%	0.495
Age						
User aged between 18 and 64 years old (ref)	42.9%	0.495	43.2%	0.495	43.9%	0.496
User aged 65 or older	57.1%	0.495	56.8%	0.495	56.1%	0.496
Ethnicity						
User of white ethnicity (ref)	90.1%	0.299	89.6%	0.306	88.6%	0.317
User of non-white ethnicity	8.2%	0.275	8.5%	0.279	8.5%	0.280
User who did not state ethnicity	1.7%	0.128	1.9%	0.137	2.8%	0.166
Language						
User whose questionnaire was in English (ref)	99.87%	0.036	99.89%	0.033	99.89%	0.033
User whose questionnaire was in non-English European languages	0.02%	0.014	0.02%	0.014	0.03%	0.016
User whose questionnaire was in South Asian languages	0.06%	0.025	0.09%	0.029	0.07%	0.027
User whose questionnaire was in Middle Eastern languages	0.04%	0.021	0.00%	0.006	0.01%	0.012
Primary support reason						
User who received physical support (ref)	54.4%	0.498	53.9%	0.498	52.0%	0.500
User who received sensory support	1.6%	0.124	1.5%	0.121	1.5%	0.123
User who received support with memory and cognition	5.2%	0.221	5.0%	0.217	5.4%	0.225
User who received learning disability support	28.5%	0.452	28.6%	0.452	30.5%	0.460
User who received mental health support	8.2%	0.274	8.6%	0.280	8.4%	0.278
User who received social support	2.2%	0.145	2.4%	0.153	2.2%	0.146
Help with questionnaire						
User who did not receive help with questionnaire	18.1%	0.385	18.3%	0.387	18.7%	0.390
User whose questionnaire was read by someone else	49.9%	0.500	49.9%	0.500	49.6%	0.500
User whose questionnaire was translated by someone else	24.2%	0.428	23.8%	0.426	25.0%	0.433
User whose questionnaire was only filled in by someone else	40.7%	0.491	39.0%	0.488	39.0%	0.488
User whose questionnaire was talked through with someone else	29.3%	0.455	29.8%	0.457	30.0%	0.458
User whose questionnaire was answered without asking by someone else	8.9%	0.285	9.4%	0.291	8.8%	0.284
Questionnaire version						
User who received a standard questionnaire (ref)	71.7%	0.451	72.0%	0.449	69.7%	0.459
User who received an easy-read questionnaire	28.3%	0.451	28.0%	0.449	30.3%	0.459
Observations	52602		55570		50441	
Means are estimated using the survey weight, and their SEs are obtained by taking into account survey stratification and clustering within local authorities. ref, reference category; SE, SEs of the mean estimate.						

Therefore, building on the study by Longo *et al.*<sup>8</sup> we investigate whether and to what extent the hypothesis of diminishing marginal returns holds by estimating the following equation:

$$\text{CRQoL}_{ij} = g(\text{ASC expenditure}_j) + \text{eligibility}_j + \text{controls}_{2,ij} + \text{error}_{2,ij} \quad (2)$$

Regression (2) improves on (1), first, by estimating a non-linear relationship between CRQoL and ASC expenditure using the quadratic function  $g$  of ASC expenditure which includes both ASC expenditure per user and its square. This implies that the estimated CRQoL effect of a newly eligible user, that is, an individual for whom ASC expenditure changes from zero to some level, is allowed

**Table 2** Descriptive statistics on local authority-level data

Variable at the local authority level	2017/2018		2018/2019		2019/2020	
	Mean	SD	Mean	SD	Mean	SD
<b>Expenditure and activity</b>						
Public adult social care expenditure (£000s)	139603	103479	145094	107970	153011	107786
Number of adult long-term support users	5679	4080	5574	4046	5585	3798
Public adult social care expenditure (£000s) per user	25.0	4.5	26.6	4.8	27.7	4.5
Proportion of eligible long-term support users	2.0%	0.5%	2.0%	0.4%	2.0%	0.4%
<b>Type of local authority</b>						
London borough (ref)	21.5%	41.2%	21.9%	0.415	22.1%	41.6%
County	17.4%	38.1%	17.2%	0.379	17.2%	37.9%
Metropolitan district	24.2%	43.0%	23.8%	0.428	24.1%	42.9%
Unitary authority	36.9%	48.4%	37.1%	0.485	36.6%	48.3%
<b>Activities of daily living in the past 2 years</b>						
Users who cannot manage personal hygiene by themselves 1 year ago	44.3%	5.9%	43.2%	5.4%	43.0%	5.7%
Users who cannot manage continence by themselves 1 year ago	23.1%	4.6%	22.5%	3.9%	22.5%	4.2%
Users who cannot dress by themselves 1 year ago	33.4%	5.5%	32.4%	5.1%	32.4%	5.4%
Users who cannot feed by themselves 1 year ago	8.3%	2.3%	8.3%	2.4%	8.2%	2.3%
Users who cannot ambulate by themselves 1 year ago	26.6%	4.6%	25.7%	4.1%	25.7%	4.4%
Users who cannot manage personal hygiene by themselves 2 years ago	43.3%	7.0%	44.2%	6.0%	43.2%	5.5%
Users who cannot manage continence by themselves 2 years ago	22.1%	4.6%	22.9%	4.8%	22.5%	4.0%
Users who cannot dress by themselves 2 years ago	32.2%	6.1%	33.3%	5.5%	32.4%	5.1%
Users who cannot feed by themselves 2 years ago	7.8%	2.2%	8.3%	2.3%	8.3%	2.4%
Users who cannot ambulate by themselves 2 years ago	25.8%	5.0%	26.4%	4.7%	25.7%	4.2%
<b>Disability</b>						
People who are sight impaired 2016/2017	0.5%	0.2%	0.5%	0.2%	0.5%	0.2%
People who are hearing impaired 2010	0.4%	0.3%	0.4%	0.3%	0.4%	0.3%
People who are sight and hearing impaired 2016/2017	0.04%	0.04%	0.04%	0.04%	0.04%	0.05%
People aged 65 or older with dementia	6.4%	0.5%	6.4%	0.5%	6.4%	0.6%
People whose disability does not limit daily activities (ref)	82.3%	3.3%	82.4%	3.3%	82.3%	3.2%
People whose disability limits daily activities a little	9.2%	1.4%	9.2%	1.4%	9.2%	1.4%
People whose disability limits daily activities a lot	8.4%	2.0%	8.4%	2.0%	8.5%	2.0%
Disability deprivation index 2015	0.089	0.630	0.079	0.632	N/A	N/A
Disability deprivation index 2019	N/A	N/A	N/A	N/A	0.092	0.615
People aged 18–64 claiming Disability Living Allowance	1.7%	0.4%	1.1%	0.3%	0.5%	0.2%
People aged 65 or older claiming Disability Living Allowance	1.6%	0.7%	1.4%	0.6%	0.7%	0.4%
People aged 65 or older claiming Attendance Allowance	2.3%	0.6%	2.3%	0.6%	2.3%	0.6%
<b>Tenure</b>						
Households with more than a person (ref)	69.4%	3.6%	69.2%	4.1%	69.4%	3.5%
Single-person households aged 0–64	18.6%	4.1%	18.7%	4.6%	18.6%	4.2%
Single-person households aged 65 or older	12.0%	2.1%	12.0%	2.1%	12.0%	2.1%
People in household with up to 0.5 persons per bedroom (ref)	13.7%	3.1%	13.7%	3.1%	13.6%	3.1%
People in household with 0.5–1.0 persons per bedroom	48.2%	5.6%	48.3%	5.6%	48.2%	5.7%
People in household with 1.0–1.5 persons per bedroom	21.7%	2.0%	21.6%	2.2%	21.7%	2.0%

Continued



Table 2 Continued

Variable at the local authority level	2017/2018		2018/2019		2019/2020	
	Mean	SD	Mean	SD	Mean	SD
People in household with over 1.5 persons per bedroom	16.4%	7.5%	16.4%	7.5%	16.5%	7.6%
People who are house owners	62.9%	12.2%	62.8%	12.3%	62.6%	12.2%
<b>Socioeconomic status</b>						
Population density per 10 000 people	0.2722	0.3259	0.2728	0.3294	0.2781	0.3377
People who are students or in a non-routine occupation (ref)	82.7%	4.6%	82.8%	4.7%	82.6%	4.5%
People who are in routine occupation	11.2%	3.3%	11.1%	3.4%	11.3%	3.3%
People who never worked and are long-term unemployed	6.1%	2.6%	6.1%	2.6%	6.2%	2.6%
Education deprivation index 2015	22.004	8.370	21.847	8.451	N/A	N/A
Education deprivation index 2019	N/A	N/A	21.832	8.714	22.227	8.565
Income deprivation index 2015	15.6%	5.0%	15.5%	5.0%	N/A	N/A
Income deprivation index 2019	N/A	N/A	13.6%	4.6%	13.9%	4.5%
People with income support	1.0%	0.4%	0.8%	0.4%	0.6%	0.3%
People with pension credit	2.8%	0.8%	2.6%	0.7%	2.5%	0.7%
<b>Informal unpaid carer characteristics</b>						
<i>Gender</i>						
Male carers (ref)	31.2%	3.3%	31.2%	3.4%	31.0%	3.1%
Female carers	68.8%	3.3%	68.8%	3.4%	69.0%	3.1%
<i>Age</i>						
Carers aged 18–64 (ref)	56.0%	9.1%	56.1%	9.2%	56.6%	9.3%
Carers aged 65 or older	44.0%	9.1%	43.9%	9.2%	43.4%	9.3%
<i>Ethnicity</i>						
Carers of white ethnicity (ref)	80.7%	19.2%	80.9%	19.2%	75.9%	21.1%
Carers of non-white ethnicity	12.8%	17.8%	12.8%	17.7%	14.3%	18.7%
Carers who did not state ethnicity	6.4%	9.7%	6.4%	9.6%	9.8%	13.8%
<i>Health condition</i>						
Carers with physical impairment	20.5%	4.0%	20.5%	4.0%	20.1%	3.6%
Carers with sight or hearing loss	16.5%	3.5%	16.4%	3.5%	16.5%	3.6%
Carers with long-standing illness	28.6%	4.6%	28.7%	4.7%	30.0%	4.4%
<i>Employment status</i>						
Carers who is retired	50.4%	7.8%	50.3%	7.8%	49.6%	8.5%
Carers who is employed	18.9%	4.2%	19.0%	4.2%	18.6%	4.3%
Carers who is self-employed	4.8%	2.1%	4.9%	2.2%	4.9%	2.1%
Carers who is unemployed	21.3%	4.5%	21.3%	4.4%	22.1%	5.5%
Carers who is not in paid work because of caring role	22.3%	7.2%	22.3%	7.2%	24.0%	6.9%
Carers who is in paid work but do not feel supported by their employer	3.9%	1.6%	3.9%	1.6%	3.9%	1.7%
Carers who is self-employed but unable to balance work and caring role	1.5%	0.9%	1.5%	1.0%	1.7%	1.1%
<i>Financial status</i>						
Carers with no financial difficulties because of caring role (ref)	53.4%	7.0%	53.4%	6.9%	51.8%	7.5%
Carers with financial difficulties because of caring role	46.6%	7.0%	46.6%	6.9%	48.2%	7.5%
<i>Living with the care recipient</i>						
Carers who live with care recipient (ref)	75.1%	8.1%	75.2%	8.0%	77.7%	7.3%
Carers who do not live with care recipient	24.9%	8.1%	24.8%	8.0%	22.3%	7.3%

Continued

Table 2 Continued

Variable at the local authority level	2017/2018		2018/2019		2019/2020	
	Mean	SD	Mean	SD	Mean	SD
<i>Duration of care</i>						
Carers in caring role for less than 6 months (ref)	0.5%	0.6%	0.7%	2.2%	0.4%	0.5%
Carers in caring role between 6 months and 1 year	2.3%	1.1%	2.3%	1.2%	2.4%	2.0%
Carers in caring role for more than 1 year	97.2%	1.4%	97.0%	2.5%	97.2%	2.2%
<i>Care task</i>						
Carers who provide personal care	68.8%	6.3%	68.8%	6.2%	70.4%	5.2%
Carers who provide physical help	57.7%	6.0%	57.8%	6.0%	58.4%	5.2%
Carers who provide other practical help	92.5%	2.9%	92.6%	2.9%	92.8%	8.2%
Carers who provide help with medicines	76.7%	5.7%	76.6%	5.7%	78.0%	8.2%
Carers who provide emotional support	84.0%	3.4%	84.0%	3.4%	84.6%	7.8%
Other						
Council tax base per user	26.2	7.7	27.2	8.5	26.9	8.0
Observations	149		151		145	
Informal unpaid carer characteristics used in the analysis for 2017/2018 and 2018/2019 are from the 2016 Survey of Adult Carers in England, while those used in the analysis for 2019/2020 are from the 2018 Survey of Adult Carers in England. N/A, not used in the analysis of that financial year; ref, reference category.						

to differ from the CRQoL effect of an existing user, that is, an individual already receiving ASC and for whom expenditure increases further. Moreover, (2) directly accounts for eligibility levels through the proportion of eligible users over the population aged 18 or older. This allows the relaxation of the assumption in (1) that LA type fully captures eligibility levels. This assumption is likely to bias the effect of ASC expenditure per user downwards if there is variability in eligibility levels within each LA type (online supplemental appendix B provides more details about this possible bias).

Regression (2) now includes two endogenous expenditure variables: ASC expenditure per user and its square. In addition, eligibility is also likely to be endogenous because unobserved need may drive both eligibility levels and CRQoL (confounding). To instrument this set of endogenous variables, we now use the council tax base per user, its square and LA type dummies (including a dummy for unitary, metropolitan and county LAs with London boroughs being the reference category). In addition to variation in council tax base, we use variation in LA type which is likely to be a good predictor of expenditure and eligibility because of factors such as innate culture and market factors. We estimate (2), by 2SLS, after predicting each of the three endogenous variables with all instruments and controls (online supplemental appendix C discusses the selection of the controls). To test empirically whether our instruments satisfy the relevance condition we follow the common rule of thumb of a first-stage (Kleibergen-Paap and Sanderson-Windmeijer) F-statistic greater than 10. Given that we have three endogenous variables and five instruments, we test the

exogeneity condition by running the common Hansen-Sargan over-identification test.

### Patient and public involvement

This study was reviewed by two members of the patient and public involvement panel within the Policy Research Unit in Economic Evaluation of Health and Care Interventions at the University of York and Sheffield. Their feedback, questions and comments helped to improve the clarity, relevance and accessibility of this study.

### RESULTS

Table 3 shows the main results. First, like Longo *et al*<sup>8</sup> we estimate (1) using data from 2017/2018. We also estimate (1) using data from 2018/2019 and 2019/2020. We find that a £1000 increase in publicly funded ASC expenditure per user increases, on average, the CRQoL of an average existing user by 0.003 (p value <0.01) in 2017/2018 and by 0.002 in 2018/2019 (p value =0.043) and 2019/2020 (p value =0.022). In all three financial years, the instrument council tax base per user passes all statistical tests.

We then estimate (2) for the same three financial years. Compared with (1), (2) allows a non-linear relationship between ASC expenditure and CRQoL. In all three financial years, we find empirical support for the hypothesis that user CRQoL increases with ASC expenditure but the effect on CRQoL declines as the level of ASC expenditure increases. At the mean ASC expenditure per user, we find that a £1000 increase in ASC expenditure per user increases the CRQoL of an existing user receiving an average ASC package by 0.006 in 2017/2018, 0.005 in 2018/2019 and 0.009 in 2019/2020. These results are

**Table 3** Key results of regression (1) and (2)

Variable	Longo <i>et al</i> <sup>8</sup>			New model (2)		
	2017/2018	2018/2019	2019/2020	2017/2018	2018/2019	2019/2020
Public adult social care expenditure per user	0.003*** (0.001)	0.002** (0.001)	0.002** (0.001)	0.006*** (0.002)	0.005*** (0.002)	0.009*** (0.003)
Public adult social care expenditure per user squared				0.0004** (0.0002)	0.0003* (0.0002)	0.0004** (0.0002)
Observations	52 602	55 570	50 441	52 602	55 570	50 441
F-test of expenditure and its square's p value	–	–	–	0.007	0.004	0.002
First stage Kleibergen-Paap rk Wald F statistic	434.3	398.6	408.9	17.7	10.9	7.4
Over-identification test's p value	0.595	0.715	0.777	0.191	0.871	0.334

Longo *et al*<sup>8</sup>=regression (1) as proposed by Longo *et al*,<sup>8</sup> new model=regression (2) in this paper.

\*\*\*P value <0.01, \*\*p value <0.05, \*p value <0.10.

The dependent variable is the user care-related quality of life measured at the individual level. Results on control variables are not reported in this table. The instrumental variables are the council tax base per user for the model proposed by Longo *et al*,<sup>8</sup> and the council tax base per user, its square and LA type dummies for the new model (2). Following Longo *et al*,<sup>8</sup> the over-identification test in their model is run by using the business rates tax base per user and the area cost adjustment index as additional instruments. All regressions are weighted using the survey weight. SEs are clustered within LAs and strata, and they are reported in parenthesis.

statistically significant at the 1% level. Online supplemental table 1 shows the marginal effect at various levels of ASC expenditure per user. For example, in 2017/2018, we find that a £1000 increase in ASC expenditure per user increases user CRQoL by 0.025 (p value <0.01) at zero expenditure and by 0.014 (p value <0.01) at £14 400, the lowest value in our sample. At £41 800, the highest value in our sample, a £1000 increase in ASC expenditure per user decreases user CRQoL by 0.007 but this is statistically insignificant. Moreover, in all financial years, instruments passed all statistical tests. Key first-stage results of all models are reported in online supplemental table A2. As a sensitivity analysis, we estimate (2) for the further financial years 2015/2016 and 2016/2017. The results of this analysis are robust and are discussed in online supplemental appendix D.

Finally, we use the CRQoL effects estimated by (2) to calculate the more policy-relevant SC-QALY effects (assuming that each estimated CRQoL effect spans 1 year) of changing ASC expenditure from different levels and by different amounts. Newly eligible users are individuals for whom ASC expenditure changes from zero to some level. The SC-QALY effect of a change in expenditure from zero to the mean LA expenditure varies between 0.342 in 2018/2019 and 0.509 in 2019/2020, as reported in online supplemental table 1. Therefore, the cost-effectiveness of providing newly eligible users with the average care package varies between £54 224 (= £27 600÷0.509 SC-QALY) in 2019/2020 and £77 778 per SC-QALY in 2018/2019. On the other hand, the SC-QALY effect of changing LA expenditure from the minimum to mean value LA expenditure varies between 0.084 in 2018/2019 and 0.111 in 2019/2020. This means that the cost-effectiveness of increasing expenditure for existing users from the minimum to mean value in the sample is between £83 784 (= [£27 600–£18 300]÷0.111 SC-QALY)

in 2019/2020 and £120 238 per SC-QALY in 2018/2019. Therefore, the cost-effectiveness of additional investment for newly eligible users is always greater than that for existing users.

## DISCUSSION

The analysis proposed by Longo *et al*<sup>8</sup> and this study provide consistent results suggesting that publicly funded ASC expenditure have on average a beneficial effect on the CRQoL of existing users. In addition, this study shows that the CRQoL gains to ASC expenditure decrease as expenditure increases. Therefore, the CRQoL effect on newly eligible users is likely to be larger than existing users. This might be because newly eligible users may have further capacity to benefit from publicly funded ASC even if they are in receipt of privately funded (formal) care or (unpaid) informal care. Where publicly funded ASC substitutes these other forms of care, then our results might suggest that publicly funded ASC may be more effective in addressing social care need. Moreover, our findings allow a comparison of the cost-effectiveness of policies that aim to extend the eligibility to ASC services with those that aim to improve ASC services for existing users. This comparison indicates that any investment that extends eligibility to ASC services is likely to be more cost-effective compared with the same resources devoted to existing ASC users.

The austerity policy implemented in the UK during the first half of the 2010s meant that a substantial proportion of people aged 65 and over (around 40%) could no longer access ASC services.<sup>3</sup> While some people might have compensated the lack of publicly funded support using more privately funded care or informal care, some others might have left with less or no support. This study suggests that, overall, reductions in access to ASC might

have generated a substantial loss in CRQoL. This is in addition to the potential health loss that occurred in the same period because of the fact that ASC is likely to impact mortality indirectly via the NHS.<sup>18</sup> Our findings on the CRQoL effects provide empirical support for policies which are able to increase eligibility by showing that extending eligibility to ASC is likely to provide greater value for money than using the same resources to increase expenditure for existing users.

Finally, our new findings on the ASC eligibility effects provides further evidence which may inform an assessment of the SC-QALY-opportunity costs of investments in new ASC services. However, the picture of the effects of ASC remains incomplete. Future research might explore whether the CRQoL effect of care and support services varies between publicly and privately funded users via the impact on individual wealth. In addition, it should focus on the effects of ASC on unpaid informal carers who are also key actors in this sector.<sup>19</sup> Similarly, the investigation of the effects of ASC on the wider economy (eg, paid production, social security benefits) may provide further evidence to inform value for money considerations of new ASC services. Evaluating the value of public resources, including ASC, is fundamental for decision makers to achieve efficient allocations. This becomes gradually more important as pressures on public finances increase and especially in those countries where the public sector is a substantial proportion of the whole economy. For example, assessing the value of publicly funded long-term care resources will play a key role across countries within the Organisation for Economic Cooperation and Development amid macroeconomic trends (eg, ageing population, increasing disability prevalence in old age, decreasing fertility) that will pose extreme challenges to long-term care systems.<sup>20</sup>

### Study limitations

Key limitations of our study are mostly related to the limitations of the available data. First, our data on CRQoL only refer to users receiving publicly funded long-term support including community-based, residential and nursing care. This implies that our findings may not apply to ASC users without long-term support (eg, users receiving only short-term support or equipment). Moreover, users of publicly funded long-term support represent that portion of the population with the highest level of need. Therefore, our results may not apply to individuals with lower levels of need. Furthermore, the survey population also includes users whose long-term support is privately funded but managed (rather than funded and managed) by the LA. As a consequence, our sample might include also these users whom we are unable to identify. They are, however, a small proportion of the population of long-term support users, about 8% on average across LAs, which implies that their probability to be drawn in the sample is small. Hence, the possible inclusion of some of these users in our sample is unlikely to have a substantial impact on our results. Finally, as we assume

that all individuals in our sample receive some publicly funded ASC, our analysis estimates the CRQoL effects when ASC expenditure per user is zero by extrapolation. However, in principle, our approach would remain valid even if data on long-term support users whose care is not publicly funded were available.

Future research could explore the sensitivity of our results to panel data methods which combine the cross-sectional and emerging time series data. Although this could account for unobserved differences between LAs it would also require new IVs which vary over time as the IVs proposed in this study are mostly time-invariant.

### CONCLUSION

This study provides an important policy-relevant insight about the SC-QALY effects of publicly funded ASC expenditure on long-term support users. It suggests that, in the English public ASC sector, additional investment to support newly eligible users offers greater value for money than extending support for existing users.

**Acknowledgements** We would like to thank the participants to the 2022 European Health Economic Association conference, held in Oslo, for their helpful comments. Moreover, we would like to thank Yvonne Birks for her feedback on our study. Finally, we would like to thank two members of the patient and public involvement panel within the Policy Research Unit in Economic Evaluation of Health and Care Interventions at the University of York and Sheffield for providing comments on our work.

**Contributors** All authors (KC, JL and SM) contributed to the concept and design of this paper. FL led on the analysis and drafting, and the final paper was edited and approved by all three authors. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting these criteria have been omitted. FL is the paper's guarantor. With this work we would like to pay tribute to SM who sadly passed away in June 2022.

**Funding** This report is independent research funded by the National Institute for Health and Care Research Policy Research Programme (NIHR PRP) through its Policy Research Unit in Economic Evaluation of Health and Care Interventions (EEPRU, grant reference PR-PRU-1217-20401).

**Disclaimer** The views expressed in this publication are those of the author(s) and not necessarily those of the NHS, the National Institute for Health and Care Research or the Department of Health and Social Care.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

**Patient consent for publication** Not applicable.

**Ethics approval** This study does not involve human participants. No ethical approval was required for this study.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** All data relevant to the study are included in the article or uploaded as supplementary information. Our data are available in the public domain and all sources are listed in table A1 of online supplemental appendix A.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iDs

Francesco Longo <http://orcid.org/0000-0002-1833-7328>

James Lomas <http://orcid.org/0000-0002-2478-7018>

#### REFERENCES

- 1 Glied S, Smith PC, Fernandez J-L. *The oxford handbook of health economics*. 2011.
- 2 Bottery S. Social care services: funding cuts are biting hard: the king's Fund. 2020. Available: <https://www.kingsfund.org.uk/blog/2020/01/social-care-funding-cuts-are-biting-hard>
- 3 Seamer P, Brake S, Moore P, et al. Did government spending cuts to social care for older people lead to an increase in emergency hospital admissions? an ecological study, England 2005–2016. *BMJ Open* 2019;9:e024577.
- 4 HM Government. *Build Back Better: Our Plan for Health and Social Care*. 2021.
- 5 Appleby J, Hemmings N, Maguire D, et al. *Public satisfaction with the NHS and social care in 2019. Results and trends from the British social attitudes survey*. London: King's Fund, 2020.
- 6 Wellings D, Jefferies D, Maguire D, et al. *Public satisfaction with the NHS and social care in 2021. Results from the British Social Attitudes Survey*. London: King's Fund, 2022.
- 7 Forder J, Vadean F, Rand S, et al. The impact of Long-Term care on quality of life. *Health Econ* 2018;27:e43–58.
- 8 Longo F, Claxton K, Lomas J, et al. Does public long-term care expenditure improve care-related quality of life of service users in England *Health Econ* 2021;30:2561–81.
- 9 NHS Digital. Adult social care Finance return (ASC-FR) guidance. 2019. Available: <https://digital.nhs.uk/binaries/content/assets/website-assets/data-and-information/data-collections/social-care-collections-2019/asc-fr-guidance-2018-19-v1.2-final.pdf>
- 10 House of Commons. Autumn statement. volume 722: debated on Thursday 17 November 2022. 2022. Available: <https://hansard.parliament.uk/commons/2022-11-17/debates/97DB3122-0068-46CD-B026-F757C8DF39AF/AutumStatement>
- 11 Amin-Smith N, Phillips D, Simpson P. *Adult social care funding: a local or national responsibility. (IFS Briefing Note No BN227)*. London: Institute for Fiscal Studies, 2018.
- 12 Brien P. *Local government finances*. London: House of Commons Library, 2018. Available: <https://researchbriefings.files.parliament.uk/documents/CBP-8431/CBP-8431.pdf>
- 13 Netten A, Burge P, Malley J, et al. Outcomes of social care for adults: developing a preference-weighted measure. *Health Technol Assess* 2012;16:1–166.
- 14 NHS Digital. *Personal Social Services Adult Social Care Survey*. England: Methodology and Further Information, 2018. Available: <https://files.digital.nhs.uk/5A/C55503/pss-ascs-eng-1718-methodology.pdf>
- 15 King D, Wittenberg R. *Data on adult social care*. 2015.
- 16 Rand S, Malley J. The factors associated with Care-Related quality of life of adults with intellectual disabilities in England: implications for policy and practice. *Health Soc Care Community* 2017;25:1607–19. 10.1111/hsc.12354 Available: <http://doi.wiley.com/10.1111/hsc.2017.25.issue-5>
- 17 Forder J, Malley J, Towers A-M, et al. Using Cost-Effectiveness estimates from survey data to guide commissioning: an application to home care. *Health Econ* 2014;23:979–92.
- 18 Longo F, Claxton K, Martin S, et al. More long-term care for better health care and vice versa: investigating the mortality effects of interactions between these public sectors. *Fiscal Studies* 2023.
- 19 Zigante V, Fernandez J-L, Mazzotta F. Changes in the balance between formal and informal care supply in England between 2001 and 2011: evidence from census data. *Health Econ Policy Law* 2021;16:232–49.
- 20 OECD. *Long-term Care and Health Care Insurance in OECD and Other Countries*. Paris: OECD Publishing, 2020.