

# Premature frailty, geriatric conditions and multimorbidity among people experiencing homelessness: a cross-sectional observational study in a London hostel

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## Abstract

**Purpose** – *The purpose of this paper is to assess frailty, geriatric conditions and multimorbidity in people experiencing homelessness (PEH) using holistic evaluations based on comprehensive geriatric assessment (CGA) and draw comparisons with general population survey data.*

**Design/methodology/approach** – *Cross-sectional observational study conducted in a London-based hostel for single PEH over 30 years old in March–April 2019. The participants and key workers completed health-related questionnaires, and geriatric conditions were identified using standardised assessments. Frailty was defined according to five criteria in Fried's phenotype model and multimorbidity as the presence of two or more long-term conditions (LTCs). Comparisons with the general population were made using data from the English Longitudinal Study of Ageing and the Health Survey for England.*

**Findings** – *A total of 33 people participated with a mean age of 55.7 years (range 38–74). Frailty was identified in 55% and pre-frailty in 39%. Participants met an average of 2.6/5 frailty criteria, comparable to 89-year-olds in the general population. The most common geriatric conditions were: falls (in 61%), visual impairment (61%), low grip strength (61%), mobility impairment (52%) and cognitive impairment (45%). All participants had multimorbidity. The average of 7.2 LTCs (range 2–14) per study participant far exceeds the average for even the oldest people in the general population.*

**Originality/value** – *To the best of authors' knowledge, this is the first UK-based study measuring frailty and geriatric conditions in PEH and the first anywhere to do so within a CGA-type evaluation. It also demonstrates the feasibility of conducting holistic evaluations in this setting, which may be used clinically to improve the health outcomes for PEH.*

**Keywords** Ageing, Homelessness, Multimorbidity, Frailty, Geriatric conditions, Inclusion health

**Paper type** Research paper

(Information about the authors can be found at the end of this article.)

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## Introduction

Homelessness is associated with extremely poor health outcomes, and cohort studies report mortality rates of 3–6 times the general population (Fitzpatrick *et al.*, 2013; Queen *et al.*, 2017; Bowen *et al.*, 2019; Lewer *et al.*, 2019). The number of people experiencing homelessness (PEH) in the UK (which includes sleeping on the streets, in insecure housing, temporary accommodation or hostels) has been steadily rising throughout the past decade (Bramley, 2017; Office for National Statistics, 2019). The number of older people in this situation is also increasing, but their health and social needs and the impact of homelessness on the ageing process are inadequately understood (Gelberg *et al.*, 1990; Centre for Policy on Ageing, 2017). Practitioners working in the field of inclusion health anecdotally report signs of premature ageing among those who have experienced multiple

exclusion and homelessness and refer to those who are “old before their time”, but a paucity of published data exists.

Frailty is a health state related to ageing, characterised by loss of in-built reserves across multiple body systems and associated with vulnerability to adverse outcomes (Fried *et al.*, 2001; British Geriatrics Society, 2015). Four studies assessed frailty among PEH in the USA using a variety of definitions, finding more than half of participants were frail (Salem *et al.*, 2013, 2014; Hadenfeldt *et al.*, 2017; Salem *et al.*, 2019), and studies in the USA and Ireland reported premature onset of geriatric conditions such as cognitive and functional impairments (Brown *et al.*, 2012, 2017; Ni Cheallaigh and Sears, 2018). In the UK, people living in hostels often have very complex health and social care needs (Shulman *et al.*, 2018; Manthorpe *et al.*, 2019). They tend to be supported by non-clinical hostel staff with variable clinical support from primary care. However, multiple barriers in accessing primary care along with challenges to proactive care planning and limited functional support in the hostel contribute to continuing poor health for many people (Crane and Joly, 2014; Bradley, 2018; Eavis, 2018; Martineau *et al.*, 2019). There is good evidence that multi-disciplinary holistic interventions such as comprehensive geriatric assessment (CGA) can reduce functional dependence and improve outcomes for people living with frailty in the general population (Turner and Clegg, 2014; British Geriatrics Society, 2015; Ellis *et al.*, 2017). CGA is a process of care comprising a multi-dimensional holistic assessment with personalised care plans and patient-centred interventions. It is commonly used in geriatric medicine and has been shown to improve independence, reduce hospital admissions and even reverse the progression of frailty (Turner and Clegg, 2014; Ellis *et al.*, 2017). A CGA-type process to identify and manage frailty and geriatric conditions for people living in hostels could enable services to better identify and address their needs.

The purpose of this study is to determine the extent of frailty and geriatric conditions in people living in a hostel, drawing comparisons with general population surveys. The study also tests different frailty scales and the feasibility of conducting a CGA-type holistic evaluation in this setting. To our knowledge, this is the first study of frailty or geriatric conditions among PEH in the UK.

## Methods

### *Study design and procedure*

This cross-sectional observational study involved a 60 minute interview with each participant conducted by a geriatric medicine registrar including a questionnaire modelled on a typical CGA and assessments for frailty and geriatric conditions (detailed further). Some interviews were conducted over several sessions, depending on participants' preferences. Hostel key workers also completed questionnaires to provide collateral information about health conditions and functional impairments. At the end of the interview, each participant was compensated with a £10 supermarket voucher.

### *Setting and participants*

The study took place in London, UK, in a 42-bed hostel for single homeless people above 30 years old, who have complex needs including mental health difficulties, behavioural issues and/or substance misuse. Residents must have a local connection to the borough and the hostel is considered suitable for residents with relatively high needs and includes a number of wheelchair accessible rooms with accessible bathroom facilities. Similar to other hostels in the borough, support for residents is primarily provided by non-clinical key workers but also includes twice-weekly site visits by a nurse and a general practitioner (GP). If residents require social care (such as for personal care or support with medications), an application must be made to the local authority.

Information sheets were distributed in February 2019. All residents were invited to participate between 4 March 2019 and 23 April 2019. Participants and key workers provided written informed consent. Exclusion criteria were inability to give informed consent or a significant communication barrier. Any health concerns identified during the study were referred to the GP or nurse providing twice-weekly clinics in the hostel, with participants' consent. The study was approved by the University College London Research Ethics Committee [ID: 6202/003].

## Variables

### *Frailty*

Frailty was assessed using the five criteria in Fried's phenotype model:

- weakness;
- slow walking speed;
- unintentional weight loss;
- exhaustion; and
- low physical activity ([Fried et al., 2001](#)).

Frailty is defined as the presence of three or more criteria. Presence of one or two criteria is classified as "pre-frail" and zero as "not frail". Assessments and diagnostic criteria ([Table A1](#)) were based on methods used in the English Longitudinal Study of Ageing (ELSA), enabling comparison to population data ([Banks et al., 2019](#)). Frailty was also assessed using the Edmonton frail scale ([Rolfson et al., 2006](#)) and the Rockwood frailty scale ([Rockwood et al., 2005](#)), but without comparable population data.

### *Geriatric conditions*

Common geriatric conditions were identified using the following tools:

- *Cognitive impairment* – Rowland universal dementia assessment scale (RUDAS) ([Storey et al., 2004](#)).
- *Urinary incontinence* – International Consultation on Incontinence Questionnaire (ISIQ-UI) ([Avery et al., 2004](#)).
- *Falls* – direct questions regarding the past 12 months.
- *Osteoporotic fracture risk* – Sheffield University FRAX tool (Centre for Metabolic Bone Diseases, 2018).
- *Malnutrition risk* – Malnutrition Universal Screening Tool (MUST) ([British Association for Parenteral and Enteral Nutrition, 2003](#))
- *Orthostatic hypotension* – Blood pressure readings at 1 and 3 min after standing.
- *Visual impairment* – Snellen chart assessment (self-reported assessment accepted in three participants unable to complete this because of mobility impairment).
- *Low grip strength* – using a dynamometer in the dominant hand, with the maximum of three attempts taken.
- *Functional impairment (reported by participants and key workers) using* – modified Katz index ([Shelkey and Wallace, 2002](#)) for five activities of daily living (ADLs): bathing, dressing, toileting, transferring and feeding; brief instrumental functional scale (BIFS) ([Sullivan et al., 2001](#)) for six instrumental activities of daily living (IADLs): taking transport, managing medications, money and appointments, writing an email and filling in an application form. Preparing a meal was not included as the hostel provided food.

- *Social isolation* – direct questions regarding contact with family or friends.
- *Mobility impairment, balance impairment and hearing impairment* – direct questions.

### *Multimorbidity*

Health conditions were recorded from participant and key worker questionnaires and grouped into 39 codes for long-term conditions (LTCs) used in the Health Survey for England (HSE) (Marshall and Higgins, 2012). The 39 LTCs are listed in Table A2. Multimorbidity is defined as the presence of two or more LTCs in one person. The participants were also asked about history of traumatic head injury and assessed for depression using the patient health questionnaire (PHQ-9) (Kroenke *et al.*, 2001).

### **Analysis**

Analysis was conducted using SPSS version 25 and R version 3.5.1 (IBM Corp, 2017; R Core Team, 2018). We first described the characteristics of the participants and prevalence of each condition. We then compared Fried frailty phenotype scores and number of LTCs in the participants with the general population. We calculated frailty phenotype scores for ELSA participants using data from 2006–2011 (Banks *et al.*, 2019) following methods used in a previous study (Gale *et al.*, 2014). We then predicted the mean scores by single-year-of-age using a Poisson regression model with polynomial terms of age (up to age cubed) as the independent variables and the frailty score as the dependent variable. Means were predicted for ages 60–89 years old because ELSA does not include younger participants. We used the same method to estimate age-related trends in number of LTCs for people aged 35–89 in the general population, using data from the HSE 2015 (Marshall and Higgins, 2012).

### **Results**

#### *Participant characteristics*

Of the 42 residents, 2 were ineligible (one because of language barrier and another because of severe hearing impairment) and 7 declined, leaving a sample of 33. Four key workers completed collateral questionnaires for all participants. Table 1 displays participant characteristics. The mean age was 55.7 years (SD = 10.0) and 91% were identified as male. Of those dependent on alcohol or drugs ( $n = 31/33$ ), seven were engaged with a drug and alcohol service.

#### *Frailty, geriatric conditions and multimorbidity*

Table 2 displays prevalence of frailty, geriatric conditions and multimorbidity. In all, 55% ( $n = 18/33$ ) of participants were frail, meeting  $\geq 3$  criteria in Fried's phenotype model and 39% ( $n = 13/33$ ) had pre-frailty. Frail participants had a mean age of 56 years (SD = 11, range 38–73). Figure 1 shows number of frailty criteria met by each participant and the mean in the general population, plotted against age. The participants met a mean of 2.6 out of 5 criteria, comparable to the mean for 89-year-olds in the general population. Frailty was identified in 55% of participants using the Edmonton frail scale and 48% using the Rockwood frailty scale (Table A3).

All geriatric conditions except hearing impairment were identified in at least 30% of participants. The most common were falls, visual impairment and low grip strength in 61%; mobility impairment in 52%; and cognitive impairment in 45% (only 3 out of 15 had a charted diagnosis). Urinary incontinence was identified in 30% and 39% were at high risk of malnutrition (MUST score of  $\geq 2$ ), but only 12% had calorie supplementation. Social isolation was common, with 55% having no family contact and 30% with no friends or any family contact. The probability of osteoporotic fracture was high in 32% ( $n = 10/31$ : we were unable to calculate probability for two participants because of incomplete data); none had bisphosphonate prescribed.

**Table 1** Participant characteristics

		n (% of 33 participants) unless stated otherwise
Age	Mean (SD), years	55.7 (10.0)
	Range, years	38–74
	35–44	5 (15)
	45–54	9 (27)
	55–64	14 (42)
Sex	65–74	5 (15)
	Male	30 (91)
	Female	3 (9)
Birth place	The UK	27 (82)
	Overseas	6 (18)
Age left school	<16 years	15 (45)
	≥16 years	18 (55)
Time in this hostel	<1 year	15 (45)
	1–2 years	9 (27)
	>2 years	9 (27)
Lifetime homelessness (Cumulative duration, includes vulnerable housing and hostels)	<7 years	8 (24)
	7–13 years	8 (24)
	14–23 years	11 (33)
	>23 years	6 (18)
Lifetime rough sleeping (Cumulative duration)	Never	5 (15)
	<1 year	11 (33)
	1–5 years	5 (15)
	>5 years	12 (36)
Smoking	Current	27 (82)
	Former	2 (6)
	Never	4 (12)
Alcohol	Currently dependent	24 (73)
	Recurrent hazardous drinking	2 (6)
	Not dependent	7 (21)
Class A drug misuse (Heroin, crack and cocaine)	Current	12 (36)
	Former	8 (24)
	Never	13 (39)

Regarding functional impairments, 18% of participants reported some difficulty or inability to carry out one or more ADL, with key workers reporting 39% had difficulty with one or more. In all, 94% of participants (and 91% of key workers) reported difficulty with one or more IADL. On an average, participants reported difficulty with 3.2 out of 6 IADLs. Full ADL and IADL results from participants and key workers are given in [Table A4](#). Just three participants (9%) had a package of care for personal care or medication prompting and six (18%) had a carer cleaning their room.

Multimorbidity was present in all participants, with an average of 7.2 LTCs per person ([Table 2](#)). [Figure 2](#) plots participants' number of LTCs against HSE data. All had more LTCs than the mean number for people their age in the general population. In spite of the study sample's average age of 56, every participant had more LTCs than the average for 90-year olds in the general population. The most common LTCs were: liver

**Table 2** Frailty, geriatric conditions and multimorbidity

n (% of non-missing values)

<b>Frailty</b>		
	Not frail (0 criteria)	2 (6)
Fried phenotype	Pre-frail (1–2 criteria)	13 (39)
	Frail (3–5 criteria)	18 (55)
<b>Geriatric conditions</b>		
Falls	None	13 (39)
Falls in the past 12 months	<i>Falls</i>	20 (61)
	<i>1–3 falls</i>	11 (33)
	<i>4–7 falls</i>	6 (18)
	<i>≥ 8 falls</i>	3 (9)
Fragility fracture risk*	Low risk (<5% probability)	9/31 (29)
Ten-year probability of major osteoporotic fracture	Moderate risk (5–10% probability)	12/31 (39)
	High risk (>10% probability)	10/31 (32)
Visual impairment	Snellen chart <20/40	20 (61)
Low grip strength	Max strength in lowest 20% for sex in ELSA data	20 (61)
Mobility impairment	Self-reported	17 (52)
Cognitive impairment	RUDAS score ≤22	15 (45)
Malnutrition: high risk	MUST score ≥2	13 (39)
Balance impairment	Self-reported	11 (33)
Urinary incontinence	ISIQ-UI score ≥4	10 (30)
Orthostatic hypotension*	≥20mmHg fall in systolic BP on standing	9/29 (31)
Social isolation	Self-reported, no friends or contact with family	10 (30)
Hearing impairment	Self-reported	3 (9)
Functional impairment	Self-reported difficulty with one or more ADL	6 (18)
	Self-reported difficulty with one or more IADL	31 (94)
<i>Multimorbidity</i>		
	Mean (SD) number of conditions	7.2 (2.7)
HSE coded LTCs (Table A2)	Minimum–Maximum	2–14
	Participants with ≥2 chronic conditions	33 (100)
Depression	No depression (score <5)	10 (30)
PHQ-9 score	<i>Depression</i>	23 (70)
	<i>Mild (score 5–9)</i>	9 (27)
	<i>Moderate/severe (score ≥ 10)</i>	14 (42)
Traumatic head injuries	None	12 (36)
Serious head injuries leading to loss of consciousness	Head injuries	21 (64)
	1–2 in lifetime	12 (36)
	≥3 in lifetime	9 (27)

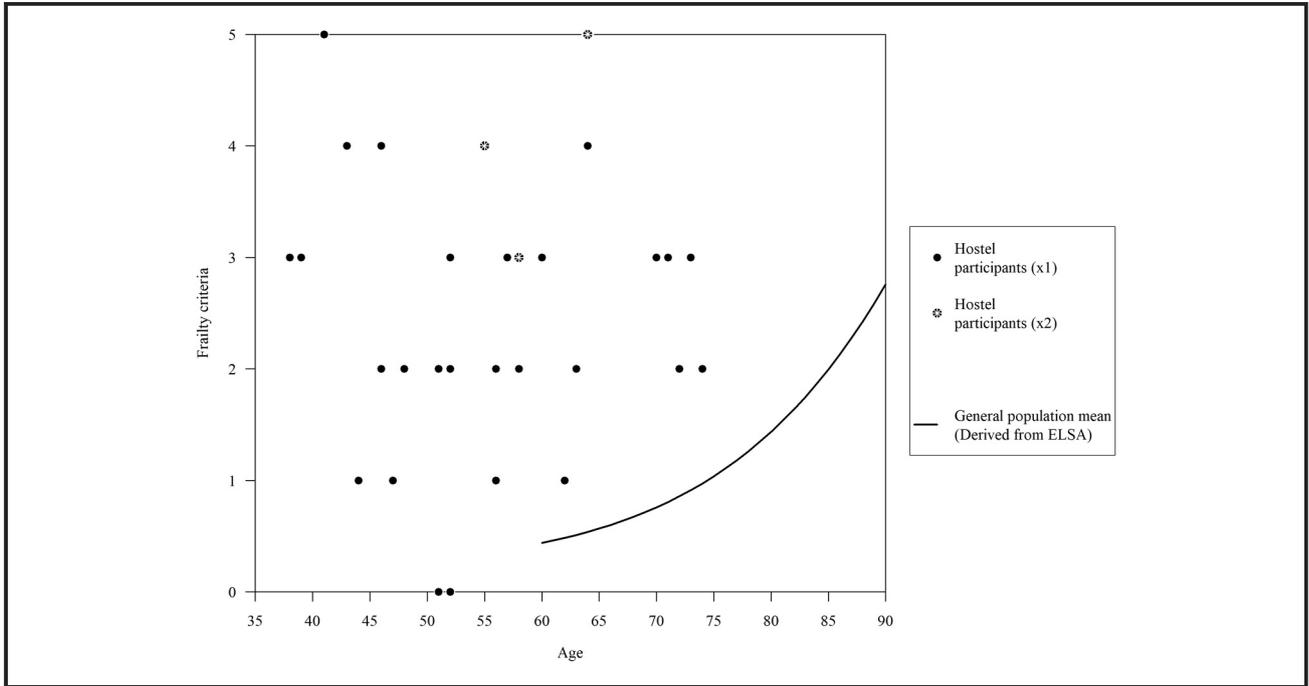
**Note:** \*Total respondents less than 33 for these two variables

disease and small bowel complaints in 79%; mental illness, serious anxiety or depression in 73%; epilepsy or seizures in 55%; visual problems in 55%; infectious diseases (HIV, TB and Hepatitis B and C) in 45%; hypertension in 42%; and emphysema in 30%. A full list is given in Table A2. Of all, 64% of participants reported a history of traumatic head injury resulting in loss of consciousness, with 27% reporting three or more in their lifetime.

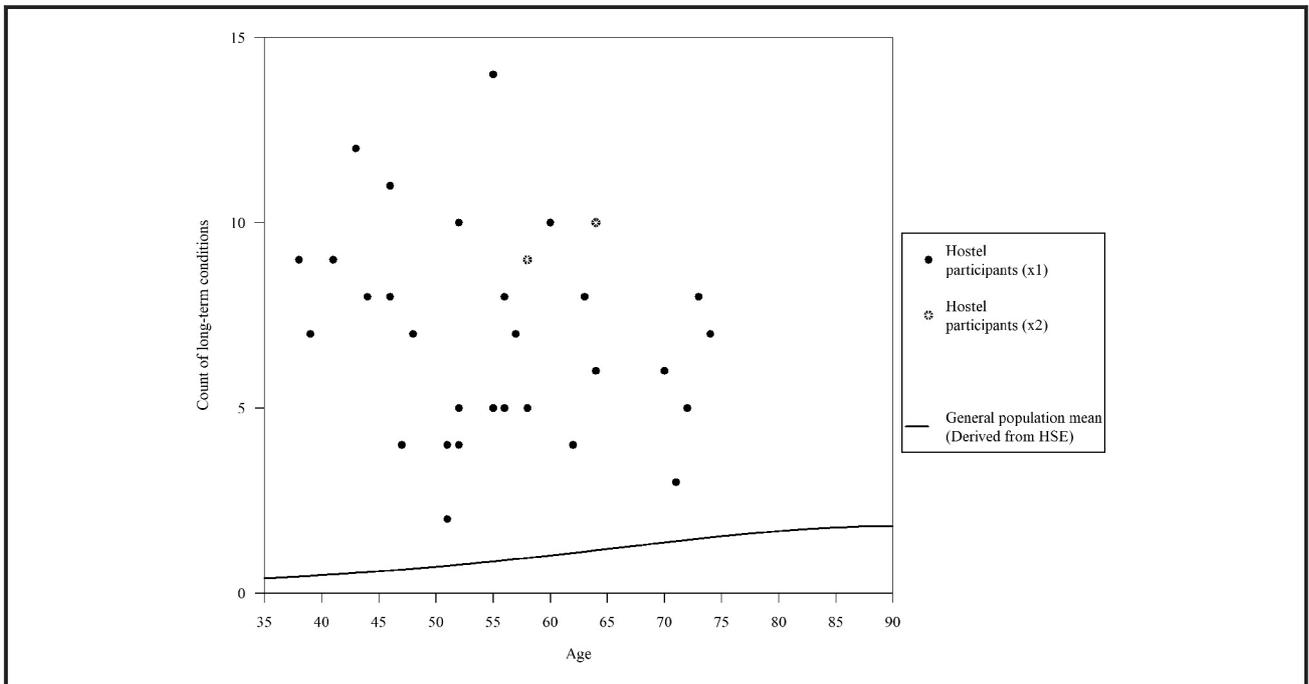
## Discussion

This study found high prevalence of frailty and geriatric conditions in residents of a hostel in London for single PEH, comparable to residents of care homes for older people. Of these, 55% were frail and frailty scores among the participants with an average age of 56 years were comparable to 89-year-olds in the general population. The hostel accommodated people with complex needs over the age of 30, so included a slightly older cohort than some other hostels, but the extent of multimorbidity far exceeded the average for even the oldest people in the general population (Marshall and Higgins, 2012). In spite of the medical services available in this hostel (most hostels in the UK do not have such services) many health needs were unmet. Functional

**Figure 1** Frailty



**Figure 2** Multimorbidity



assistance and personal care packages were rarely provided, with non-clinical key workers being the primary source of support for residents with extensive multimorbidity and high degrees of complexity and vulnerability.

### *Strengths and limitations*

We achieved a high response rate (83% of eligible residents) through flexibility with the structure and timing of interviews and gaining support from hostel staff, demonstrating the feasibility of a CGA-type evaluation in this context. We used robust assessment tools for geriatric conditions and improved the sensitivity of reported LTCs using collateral information from key workers. Participant-reported functional impairments may represent an underestimation of need, since self-assessment by homeless adults has been shown to under-identify impairments (Rodriguez-Guzman *et al.*, 2016). This highlights the importance of collateral information, but functional abilities should ideally be directly assessed.

The main limitation is the small sample size. We focussed on a detailed assessment of a specific population rather than achieving a large sample, meaning we were unable to analyse associations between geriatric conditions and participant characteristics (such as duration of homelessness) or estimate the prevalence of conditions with precision. While it is not possible to generalise the results to the wider homeless population, all residents had a local connection to the borough and participant characteristics are similar to other surveys of PEH (Homeless Link, 2014; Bowen *et al.*, 2019). Therefore, boroughs with ageing populations of people who are homeless are likely to have people living in hostels or other forms of temporary accommodation with equivalent need.

### *Comparison with existing literature*

PEH are underrepresented and excluded from many aspects of society and research is no exception. To our knowledge, this is the first UK-based study examining frailty and geriatric conditions among PEH and the first anywhere to do so within a CGA-type evaluation. The studies of frailty and geriatric conditions in homeless populations in the USA reported comparable prevalence data (Salem *et al.*, 2013, 2014; Hadenfeldt *et al.*, 2017; Salem *et al.*, 2019). Other studies also report high rates of multimorbidity associated with homelessness, but direct comparison of number of LTCs is difficult because of different classification and assessment methods (Queen *et al.*, 2017; Bowen *et al.*, 2019).

### *Implications for practice*

This study reveals unmet health and care needs, some of which have been previously described (Crane and Joly, 2014; Shulman *et al.*, 2018; Eavis, 2018; Manthorpe *et al.*, 2019). Hostels are intended to provide short-term temporary accommodation before residents move onto more independent living, but a lack of access to sheltered housing or residential or nursing home placements, particularly in the context of drug or alcohol use, leads to many people staying for years (Table 1). This has implications for health and social care provision in hostels; the fact that many participants had difficulty with ADLs and IADLs but only 9% had support from a care package demonstrates a need to improve access to Care Act 2014 assessments (Cornes *et al.*, 2016).

The study highlights an urgent need to assess frailty and consider geriatric conditions in PEH at a younger age than in the general population. Primary care guidance for managing older people with frailty states that patients should be targeted for CGA, prioritised for management of multimorbidity and have opportunities to consider advance care planning including appropriate place of care (Turner and Clegg, 2014; British Geriatrics Society, 2015; Ellis *et al.*, 2017). This proactive patient-centred approach is lacking in the majority of encounters with mainstream services for this patient group, which frequently takes the form

of crisis-driven hospital attendances (Bradley, 2018; Eavis, 2018; Bowen *et al.*, 2019; Martineau *et al.*, 2019). Primary care has a vital role in addressing this inequity. In hostels such as this, where there is primary care in-reach, there are opportunities to be more proactive, incorporating frailty assessments and CGA into consultations. Input from geriatricians and multi-disciplinary team members with experience of working with older people may also improve care where there is evidence of premature ageing and involvement should be based on clinical need rather than age.

In hostels without in-reach primary care, residents with complex needs often experience significant barriers in accessing mainstream primary care services for a number of reasons (Bradley, 2018; Eavis, 2018). Clinical commissioning groups and primary care networks should consider how to address these unmet needs and ensure their provision is inclusive and reaching this marginalised vulnerable group. Obtaining accurate functional assessments for PEH and frailty is essential to ensure they receive the support they are entitled to under the 2014 Care Act (Comes *et al.*, 2016; Martineau *et al.*, 2019). Good practice might include frailty assessment by hostel staff followed by CGA-type evaluation in selected residents by a GP and other health-care professionals. Selected patients should have care coordinators assigned as recommended for elderly patients, with cases reviewed in wider multi-agency meetings that include housing and social care services (Turner and Clegg, 2014; British Geriatrics Society, 2015).

Quantifying multiple needs using a CGA-type process borrowed from principles used in geriatric medicine will be of practical interest to health and social care professionals who work with PEH and other forms of social exclusion. The process informs person-centred care planning and can help advocate for appropriate support for people with signs of premature ageing, frailty or multiple complex needs (Turner and Clegg, 2014; Ellis *et al.*, 2017). The appropriate frailty scale to use in an assessment depends on the setting and purpose. The Fried phenotype is commonly used in research and most easily compared to population data, but is less practical for routine clinical use, as it requires time-consuming physical assessments that must be replicated accurately. The Rockwood scale relies heavily on appraisal of physical functional abilities (often preserved in younger people with frailty, who have experienced homelessness) and accounts less for other aspects of frailty, potentially resulting in lower sensitivity for frailty identification in this group. We recommend the Edmonton frail scale for use with homeless patients, particularly in a hostel or equivalent community setting, because it can be administered by non-clinical staff and has the advantage of highlighting specific areas for intervention in subsequent care plans (Rolfson *et al.*, 2006). It is important to note that no frailty scale has yet been validated for younger populations, but our findings and experience suggest they are of real value. More research and larger studies are needed to evaluate frailty scales in inclusion health populations and others at risk of premature ageing.

## Conclusions

PEH are at high risk of premature frailty and geriatric conditions alongside complex multimorbidity. A needs-based rather than age-based approach is essential for appropriate assessment of this population to reduce health inequities. Frailty assessment represents a useful and feasible method for identifying and targeting people for holistic person-centred care and support.

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*Ethical Approval:* The study was approved by the University College London Research Ethics Committee (ID: 6202/003). All participants provided informed consent before taking part.

*Competing interests:* All authors declare no competing interests, no support from any organisation for the submitted work, no financial relationships with any organisations that might have an interest in the submitted work in the previous three years and no other relationships or activities that could appear to have influenced the submitted work.

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## Appendix

**Table A1** Frailty phenotype measurements

<i>Frailty criteria</i>	<i>Method</i>	<i>Positive result</i>
Weakness	Assessed with a grip strength dynamometer in the dominant hand, with the maximum of three attempts taken	Participants were judged to have weakness if maximum strength was in the lowest 20% of the distribution for their sex from the general population reference data from ELSA
Slow walking speed	Timed-up-and-go (TUG) test (participants instructed to stand from a seated position, walk 3 m, turn around, walk back and return to a seated position)	Slow speed defined as TUG greater than 12 s or an inability to walk
Unintentional weight loss	Height and weight measured	BMI < 18.5 or > 4.5kg/5% weight loss in 1 year compared to previous weight or self-reported > 4.5kg/5% weight loss in 1 year if no previous weight documented
Exhaustion	Asked "in the past 6 months, how often do you feel fatigued or exhausted?"	Answered "most of the time" Other negative options were "not at all", "rarely" and "some of the time"
Low physical activity	Asked "in the past 30 days, how often have you done physical activity for more than 10 minutes at a time?" Answered for mild, moderate and vigorous activity	Answered "hardly ever" for both moderate and vigorous activities Other negative options were "1-3 times a month", "1 to 2 times a week" and "more than 3 times a week"

**Table A2** Most common LTCs by HSE LTCs categories

<i>Study rank</i>	<i>HSE no.</i>	<i>Type of LTC</i>	<i>Frequency of occurrence out of 33 participants</i>
1	27	Other digestive complaints (stomach, liver, pancreas, bile ducts, small intestine – duodenum, jejunum and ileum)	26 (79%)
2	4	Mental illness/anxiety/depression/nerves (nes)	24 (73%)
=3	6	Epilepsy/fits/convulsions	18 (55%)
=3	9	Cataract/poor eye sight/blindness	18 (55%)
5	37	Infectious and parasitic diseases	15 (45%)
6	17	Hypertension/high blood pressure/blood pressure (nes)	14 (42%)
7	22	Bronchitis/emphysema	10 (30%)
8	3	Other endocrine/metabolic	9 (27%)
=9	8	Other problems of nervous system	8 (24%)
=9	20	Varicose veins/phlebitis in lower extremities	8 (24%)
=9	21	Other blood vessels/embolic	8 (24%)
=9	26	Stomach ulcer/abdominal hernia/rupture	8 (24%)
=9	32	Other bladder problems/incontinence	8 (24%)
=9	36	Other problems of bones/joints/muscles	8 (24%)
=15	28	Complaints of bowel/colon (large intestine, caecum, bowel, colon and rectum)	6 (18%)
=15	30	Kidney complaints	6 (18%)
=15	34	Arthritis/rheumatism/fibrositis	6 (18%)
=15	38	Disorders of blood and blood-forming organs and immunity disorders	6 (18%)
=19	1	Cancer (neoplasm) including lumps, masses, tumours and growths and benign (non-malignant) lumps and cysts	4 (12%)
=19	18	Other heart problems	4 (12%)
=19	39	Skin complaints	4 (12%)
=22	2	Diabetes including hyperglycaemia	3 (9%)
=22	11	Poor hearing/deafness	3 (9%)
=22	15	Stroke/cerebral haemorrhage/cerebral thrombosis	3 (9%)
=22	23	Asthma	3 (9%)
=22	35	Back problems/slipped disc/spine/neck	3 (9%)
=27	16	Heart attack/angina	2 (6%)
=27	29	Complaints of teeth/mouth/tongue	2 (6%)
=29	5	Mental handicap	1 (3%)
=29	7	Migraine/headaches	1 (3%)
=29	10	Other eye complaints	1 (3%)
	12	Tinnitus/noises in the ear	0
	13	Meniere's disease/ear complaints causing balance problems	0
	14	Other ear complaints	0
	19	Piles/haemorrhoids	0
	24	Hayfever	0
	25	Other respiratory complaints	0
	31	Urinary tract infection	0
	33	Reproductive system disorders	0

**Table A3** Study results for frailty using Fried frailty phenotype, the Edmonton frail scale and the Rockwood frailty scale

	Frailty		
	All respondents n =33 (%)		
	Rockwood frailty scale	Edmonton frail scale	Fried frailty phenotype
Not frail	6 (18)	9 (27)	2 (6)
Vulnerable/pre-frail	11 (33)	6 (18)	13 (39)
Frail	16 (48)	18 (55)	18 (55)
Mild	8 (24)	7 (21)	
Moderate	5 (15)	7 (21)	
Severe	3 (9)	4 (12)	

**Table A4** Study results for modified Katz index and BIFS; participant and keyworker results

Activity	No difficulty		Some difficulty (requires support)		A lot of difficulty or unable		Do not know or missing data	
	Participants	Keyworkers	Participants	Keyworkers	Participants	Keyworkers	Participants	Keyworkers
Modified Katz index for ADLs								
Figures are number (% of 33 participants)								
Bathe	29 (88%)	20 (61%)	0	7 (21%)	4 (12%)	6 (18%)	0	0
Dress	30 (91%)	23 (70%)	1 (3%)	8 (24%)	2 (6%)	2 (6%)	0	0
Toilet	28 (85%)	27 (82%)	1 (3%)	2 (6%)	4 (12%)	3 (9%)	0	1 (3)
Transfer	29 (88%)	28 (85%)	3 (9%)	4 (12%)	1 (3%)	1 (3%)	0	0
Feed	31 (94%)	28 (85%)	2 (6%)	4 (12%)	0	1 (3%)	0	0
<i>BIFS for IADLs</i>								
Figures are number (% of 33 participants)								
Take public transport	23 (70%)	26 (79%)	6 (18%)	5 (15%)	4 (12%)	2 (6%)	0	0
Manage medications	20 (61%)	10 (30)	8 (24%)	6 (18%)	5 (15%)	10 (30%)	0	7 (21%)
Manage money	2 (6%)	11 (33%)	24 (73%)	13 (39%)	7 (21%)	6 (18%)	0	3 (9%)
Manage appointments	12 (36%)	5 (15%)	19 (58%)	18 (55%)	2 (6%)	8 (24%)	0	2 (6%)
Write an email	6 (18%)	4 (12%)	5 (15%)	12 (36%)	22 (67%)	12 (36%)	0	5 (15%)
Fill out application	6 (18%)	4 (12%)	16 (49%)	13 (39%)	10 (30%)	14 (42%)	1 (3%)	2 (6%)

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