



Home truths: Are housing-related events more important for residents' health compared with other life events?

Claire Cleland, Ade Kearns, Carol Tannahill & Anne Ellaway

To cite this article: Claire Cleland, Ade Kearns, Carol Tannahill & Anne Ellaway (2016) Home truths: Are housing-related events more important for residents' health compared with other life events?, *Housing Studies*, 31:5, 495-518, DOI: [10.1080/02673037.2015.1094565](https://doi.org/10.1080/02673037.2015.1094565)

To link to this article: <https://doi.org/10.1080/02673037.2015.1094565>



© 2015 The Author(s). Published by Taylor & Francis



Published online: 15 Oct 2015.



Submit your article to this journal [↗](#)



Article views: 1350



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)

Home truths: Are housing-related events more important for residents' health compared with other life events?

Claire Cleland^a, Ade Kearns^b, Carol Tannahill^c and Anne Ellaway^a

^aMRC/CSO Social and Public Health Sciences Unit, University of Glasgow, Glasgow, UK; ^bUrban Studies, School of Social and Political Sciences, University of Glasgow, Glasgow, UK; ^cGlasgow Centre for Population Health, Glasgow, UK

ABSTRACT

Moving home and home improvements are significant life events, but their health impacts are rarely studied in relation to other life events that occur relatively frequently in deprived populations. This article examines both housing and personal life events over a three year period among a study group living in deprived areas of Glasgow, in order to consider their impacts upon the health and well-being of residents. Housing-related events are the most frequently occurring life events, with relatively minor negative impacts upon physical and mental health and mental well-being; the effects of housing events are attenuated when other life events are taken into account. The largest negative effects on health are associated with serious health episodes, crime victimisation and relationship break-up, with the largest positive effects associated with getting a job. There is a case for holistic regeneration which offers personal support for life events and seeks positive interactive effects.

ARTICLE HISTORY

Received 11 December 2014
Accepted 4 August 2015

KEYWORDS

Stressful life events; home improvements; housing-related events; health; well-being; regeneration

Introduction

This article seeks to position major housing events, such as moving home or having one's home substantially improved, within the context of other major life events which may impact upon the health and well-being of residents. The reason for doing this is that evaluations of housing events, such as of the impacts of housing improvements or relocation upon residents' health, often consider these housing events as discrete phenomena. Whilst such studies will tend to take into account the socio-demographic characteristics of the people concerned, such as their age and gender, in estimating the health effects, they rarely consider whether other major life events may also have affected the people concerned around the same time as the housing event. Concurrent life events could either mask or exaggerate the health effects of the housing event itself. We begin by reviewing the field of what are termed 'stressful life events' (SLEs) in the health studies literature, before turning our attention to the study of housing events. We then report on an analysis of housing

CONTACT Claire Cleland  claire.cleland@glasgow.ac.uk

© 2015 The Authors. Published by Taylor & Francis.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

and other life events and their links to health outcomes in an ongoing study of the impacts of housing improvements and regeneration programmes in Glasgow. The summary and discussion thereafter assesses the relative importance of housing and other life events for the health and well-being of residents in deprived areas and considers the implications of the findings for housing and regeneration policy.

Life events

Research into life events and health has spanned over five decades; initially, it was assumed that it was the degree of change represented by a life event which was associated with stress, now it is believed that it is only specific types of life events, i.e. those which are adverse or negative, which are potentially damaging. SLEs have been defined as any event that occurs throughout the life course and causes significant disruption or requires readjustment to an individual's daily life and/or their usual routines (Dohrenwend, 2006; Tamers *et al.*, 2014; Turner & Wheaton, 1997). Most SLEs can be defined as either desirable or undesirable, with those being classified as undesirable (such as bereavement, unemployment, redundancy and victimisation) generally having negative implications for the individual; and those as desirable (such as securing a new job contract, receiving a promotion at work or getting married) promoting a range of positive emotions (Holmes & Rahe, 1967; Tamers *et al.*, 2014). However, we must also recognise that many SLEs cannot be definitively categorised as either desirable or undesirable: their effect is dependent on the personal situation of the individual concerned. Such SLEs could be considered as transitional providing the individual with conflicting emotions and making it problematic for researchers to position the SLE within a specific category. Examples include divorce, breakdown of a relationship, retirement and birth of a child (Holmes & Rahe, 1967; Tamers *et al.*, 2014).

SLEs have been reported to cause a range of effects on the individual, acting through both direct and indirect mechanisms. Gallo *et al.* (2006) found that for individuals aged over 50 years who were forced to retire from their current position of employment, retirement had a direct health effect, causing a greater than twofold increased risk of stroke and myocardial infarction in comparison with their age equivalent working counterparts. This remained even after adjusting for vascular event risk factors such as socio-economic status, obesity and hypertension (Gallo *et al.*, 2006). Another undesirable SLE – bereavement – has also been found to have detrimental and often fatal implications. A recent review (Buckley *et al.*, 2010) found that not only is bereavement one of life's unique stressors, increasing the risk of morbidity and mortality for those left behind, but the risk of experiencing a cardiac event is highest during the early stages of bereavement (first six months) regardless of age or sex (Buckley *et al.*, 2010). Whilst many of the direct detrimental health impacts of undesirable SLE can be chronic and permanently damaging, others, for example anger and depression, may only be temporary, lasting several weeks to months depending on the individual involved (Buckley *et al.*, 2010; Schwarzer & Schulz, 2002).

In addition to the direct impacts that SLEs pose to the health of the individual, it has been recognised that SLE can also have a range of unhealthful indirect effects. These operate, for example, via the uptake of health damaging behaviours, such as increased alcohol consumption, smoking, poor diet or participation in risky lifestyle behaviours (Bronsealer *et al.*, 2008; Buckley *et al.*, 2010; Schwarzer & Schulz, 2002; Tamers *et al.*, 2014; Umberson, 1992) and potentially have long-lasting implications for health. Specifically, a recent study

by Tamers *et al.* (2014) reported that subsequent to the occurrence of a SLE, changes in alcohol consumption were observed for both females and males. Notably following the SLE of marriage and divorce (separately) alcohol consumption for both sexes increased; and in addition, males also experienced an increased alcohol intake following a job promotion but a decreased intake postretirement and after the death of a loved one (Tamers *et al.*, 2014). A review performed by Bronselaer *et al.* (2008) also found that individuals who had gone through a divorce or relationship separation expressed feelings related to a lower level of mental health and were found to generally be in a poorer state of physical health and to exhibit higher levels of health damaging behaviours, in comparison with those who had not experienced divorce or separation.

Housing life events

SLEs are not restricted to those regarding an individual's personal relationships, health or employment status; recent research in both the United Kingdom (UK) and the United States of America (USA) has investigated the impact of SLEs relating to the home, in the form of a house move, housing improvements and involuntary relocation or 'displacement' (Allen, 2000; Clark *et al.*, 2007; Egan, Katikireddi, *et al.*, 2013; Fullilove, 1996; Keene & Ruel, 2012). Specifically, research has shown that a long-standing association between poor housing and poor health, and detrimental implications for mental health as a result of displacement (Allen, 2000; Fullilove, 1996). Similar to personal SLEs, housing SLEs also have direct and indirect implications for the individual on both a short- and long-term scale.

The World Health Organization (WHO) and many researchers have reported that housing and the built environment play a critical role in the health of the individual; and for that reason it has been established that both housing and the built environment warrant vital and immediate attention as they have the potential to enhance both physical and mental health and promote social well-being (Bonnefoy, 2007; Petticrew *et al.*, 2009; WHO, 2008). Consequently, policymakers have hypothesised that if improvements are made to the home, or individuals are relocated to an improved place of residence, their health and well-being will improve; and that in the longer term this could help to diminish the widening gap relating to health inequalities between varying levels of socio-economic disadvantage (Egan, Katikireddi, *et al.*, 2013; Kearns *et al.*, 2009; Marmot, 2011; Marmot *et al.*, 2008; Petticrew *et al.*, 2009; Thomson *et al.*, 2009). As we shall see, however, there is a question as to whether housing and regeneration programmes are able to have such impacts upon people's health if they do not provide support to help people cope with other, concurrent SLEs.

Housing improvements

Research to date offers conflicting findings relating to housing SLEs, making it challenging for researchers to determine the extent to which SLE can impact the health of the individual or their families in a positive or negative manner (Egan, Katikireddi, *et al.*, 2013). Previous research published as part of a systematic review regarding housing improvements found that following warmth and energy efficiency improvements, general, mental and respiratory health benefits were reported (Thomson *et al.*, 2009). However, it should be noted that the evidence base relating to the health impacts of housing improvements is somewhat ambiguous although this is not to suggest that housing improvements are detrimental to the health

of the resident (Thomson *et al.*, 2009). A later review by the same authors pointed out that some of the challenges to being able to identify the health impacts of housing improvements stem from the heterogeneity of the population group who receive the treatment, and the unknown potential-to-benefit among the group concerned (Thomson *et al.*, 2013). This heterogeneity and potential-to-benefit may partly result from the advent of other SLEs.

House moves and relocation

Although research in the field of housing studies has not routinely made use of the idea of life events, there is recognition that changes in people's lives may affect the meaning of their home and the housing pathways they follow (Clapham, 2002). Clearly, many of the SLEs mentioned earlier have implications for housing needs and choices, and yet reviews of housing and health, whilst examining the effects of housing occupancy and conditions, often omit to consider the impacts of house moves (BMA, 2003; Evans *et al.*, 2003). Residential mobility, particularly high frequency residential change is, however, generally taken to have negative impacts upon children and young people, for example in terms of behavioural and emotional problems and adolescent depression (Jellyman & Spencer, 2008). For adults, the impacts of housing mobility on health have mostly been studied in relation to policy programmes seeking to assist people to move away from low-income public housing to less-poor neighbourhoods, especially in the USA, with the conclusion of one review being that there may be gains to psychological health, but that many health outcomes are poorly measured if at all in such studies (Acevedo-Garcia *et al.*, 2004).

In terms of relocation in relation to the health of the individual, Cooper *et al.*, (2013) reported a marked and sustained improvement in residents' depressive symptoms subsequent to relocation from an area of socio-economic disadvantage. Conversely, previous literature has reported that an involuntary move can be harmful not only to physical health: it can also have damaging effects on mental health as people experience feelings of powerlessness and distress, suffer the psychological trauma of irreversible uprooting to an unfamiliar neighbourhood and a scattering of their social networks (Cao *et al.*, 2012; Keene & Geronimus, 2011; Keene & Ruel, 2012). However, in one of the few studies to consider housing relocation in a wider context, as we wish to do here, Lelevrier (2013) pointed out that 'forced relocation does not have the same meaning for everyone, and will depend on previous and projected phases within the overall residential trajectory' (p. 267). In other words, the effects of relocation depend in part on what else had happened in someone's life that would affect their housing intentions and desires in the periods before and immediately after the housing event itself. As she says: '... taking into account the long-term trajectory and not just the relocation stage reduces the importance of the latter ...' (p. 267) (Lelevrier, 2013).

Communities and life events

Negative life events tend to occur more frequently among people living in deprived communities as previously reported in research assessing 'Stress, Life Events, and Socioeconomic Disparities in Health' (Evans & Kim, 2010; Hatch & Dohrenwend, 2007; Lantz *et al.*, 2005; Miller *et al.*, 2009). For example, they are more likely to experience events such as the death

of a close family member or friend, widowhood, divorce, unemployment and crime (Ellaway & Macintyre, 2000; King & Ogle, 2014; Lantz *et al.*, 2005). Furthermore, since negative life events tend to cluster in deprived areas, then other stressors such as a lack of health promoting opportunities may amplify the effects of negative life events (Dohrenwend, 1973; Evans & Kim, 2010).

Urban regeneration

Deprived areas, such as those studied here, are regularly subject to attempts at regeneration. Area-based regeneration policies in the UK have at various times included mention of health issues, but it is only since the late 1990s that health has featured as an explicit, intended outcome from regeneration and part of the justification for it (Kearns *et al.*, 2009). Reviews have tended to find that the evidence does not substantiate impacts on health outcomes, for a number of reasons, including health outcomes are often measured by proxy, rather than directly; theories of change for health are not made explicit; and implementation and evaluation need to be informed by the views of residents (Atkinson *et al.*, 2006; Popay, 2001; Thomson *et al.*, 2006).

An analysis of the current era of regeneration policy in Scotland reported that both written policies and policymakers themselves subscribed to a holistic model of regeneration in which health and well-being were emergent outcomes. However, policymakers were sceptical about the system's ability to deliver all of the necessary elements of a holistic approach, in particular recognising an often inadequate expenditure on social regeneration programmes and expressing a desire for a new, personal approach to boosting residents' mental health and confidence on a one-to-one basis so that they could take responsibility for choices to improve their lives alongside improvements to their living conditions and environments (Beck *et al.*, 2010).

Research aims

From our review of the SLE literature, it is evident that the evidence base is not only conflicting but inconclusive and this has led to limited opportunities to inform practice and policy. In addition, the majority of research efforts have focused on discrete analysis, concentrating on specific person-centred or housing-related SLEs in relation to the health of the individual. To our knowledge, there has been no research performed to date that has aimed to compare and contrast the health and well-being impacts of both personal and housing-related SLEs that have occurred within the same period of time.

Reflecting this, the current study was sought to achieve three things. Firstly, to establish the rate of occurrence of different SLEs in an adult population residing across deprived areas in the city of Glasgow. Secondly, to determine the impact of each discrete SLE on the health and well-being of the individual. Thirdly, to examine the relative importance for the health and well-being of the individual of housing-related SLEs in comparison with personal SLEs that occurred within the same time period. In addition, we wanted to find out whether the relationship between housing-related SLEs and health and well-being outcomes is attenuated when other personal SLEs are also taken into account.

Table 1. Study area characteristics as at 2005–2006.

Study area	Approximate population	(%) Dwellings rented	(%) Income deprived	(%) Female population aged 65+	Alcohol-related mortality ^a
<i>Transformational regeneration areas</i>					
Red road flats	2,470	99	39	5	105
Shawbridge	1,620	91	52	13	95
Sighthill	4,150	98	35	8	125
<i>Local regeneration areas</i>					
Gorbals riverside	640	100	42	18	220
Scotstoun flats	1,520	100	25	4	230
St Andrews drive	780	85	54	17	90
<i>Wider surrounding areas</i>					
Wider red road	8,180	26	29	22	45
Wider scotstoun	3,640	50	29	22	70
<i>Housing improvement areas</i>					
Birness drive ^b	600	100	n/a	n/a	n/a
Carntyne	2,480	48	29	32	80
Govan	980	81	42	22	155
Riddrie	4,480	42	27	39	55
Townhead/ Drygate	1,290	88	50	31	95
<i>Peripheral estates</i>					
Castlemilk	4,530	89	40	11	50
Drumchapel	7,960	84	43	11	105

Sources: GoWell (2007); Turner (2008); Walsh (2008).

^aAge and sex standardised rate per 100 000 people, 2001–2005.

^bBirness Drive was added to the study for Wave 3 in 2011, so was not included in earlier analyses.

Methods

Study population

Data for the current analysis were collected as part of a larger ongoing GoWell research project across Glasgow (Egan *et al.*, 2010). Glasgow is the largest city in Scotland with previous reports denoting the high levels of deprivation and ever widening health inequalities which exist within the city; specifically, within the most deprived areas of Glasgow, life expectancy has been estimated to be approximately 15 years shorter than the most affluent areas (Hanlon *et al.*, 2006; Walsh, 2008; WHO, 2008).

For that reason, GoWell was designed by a multidisciplinary team to investigate the impact of housing improvements and area regeneration on the health and well-being of the residents of fifteen communities across the city of Glasgow to inform research, policy and practice (Egan *et al.*, 2010). All fifteen study communities have been classified within the most deprived group in Scotland, which are often the target of special or supplementary public policy attention and investment; the level of income deprivation in the study areas at the start of the programme ranged from 25 to 54% of the resident population, compared with a national rate of 14% at the time (Table 1). The study areas also vary in terms of their age structure and health, as Table 1 shows. The two peripheral estates in the study are relatively young in age, with one-in-ten females aged 65 or over, whereas the areas of housing improvement comprise a third retired people. As an indication of health, alcohol-related mortality varies fivefold across the study areas.

Of the 15 study areas, 6 are subject to area regeneration – including four where wide-scale clearance, demolition and redevelopment are underway, in addition to some housing improvements. The regeneration is part of a joint programme of Transformational Regeneration Areas (TRAs) and Local Regeneration Areas (LRAs) implemented by the main social landlord and the city council across 15 areas of the city since 2005 (Egan *et al.*, 2010; GHA, 2005). Both of these groups of areas comprise inner city mass housing estates built in the 1960s and 1970s, consisting either entirely of high-rise blocks or of a mixture of high-rise and medium rise blocks. The TRAs tend to be larger in size and were designated to undergo wholesale demolition and redevelopment. The LRAs tend to be smaller in size and were designated to undergo a mixture of refurbishment, with a small amount of demolition. Both types of regeneration area have also experienced a range of other amenity improvements and community interventions. As Table 1 shows, the regeneration areas are predominantly rented housing, whereas the areas surrounding them are more evenly divided between rented and owner occupied housing. The remaining nine study areas are subject to varying degrees of housing improvement and new housing developments. The housing improvements are being carried out to comply with a legislative requirement introduced in 2004 that all social housing meet a new Scottish Housing Quality Standard by 2015 (Communities Scotland, 2007).

Data source

The GoWell study consisted of three cross-sectional Community Health and Well-being Survey waves (wave 1, 2006; wave 2, 2008; and wave 3, 2011) with a nested longitudinal cohort (Egan *et al.*, 2010). A stratified random sample of domestic addresses was selected in nine of the study areas; in the other six areas, where clearance and redevelopment processes were underway, all addresses were selected for the survey for waves 1 and 2. In terms of wave 3, each of the addresses visited at both wave 1 and wave 2 were sampled; this included both remaining participants and new occupants. Each of the GoWell surveys achieved response rates of over 45%: wave 1, 50.3% ($n = 6003$); wave 2, 47.5% ($n = 4869$); and wave 3 45.4% ($n = 4270$) (Curl & Kearns, 2015). The data derived for the current study were collected as part of the wave 3 survey.

Participants provided written consent and were interviewed face-to-face, within their home. Individuals were eligible for participation in the GoWell survey if they were (1) at least 16 years of age; (2) currently paying a mortgage, owned their own home or were considered to be a social sector tenant or private sector leaseholder; and (3) were either the sole or main adult resident residing in the household. If more than one adult met the study criteria and was eligible for participation the next birthday rule applied. The GoWell Community Health and Well-being Survey included demographic questions relating to the individual and those residing in their household; the condition of their home; their community; amenity use; health behaviours; and the current state of their physical and mental health.

Ethical approval

Ethical approval was acquired in 2005 for the GoWell study and was provided by the NHS Scotland B MREC committee (No. 05/MRE10/89).

Measures

Health outcome measures

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) was implemented as a measure of the participant's mental well-being. The WEMWBS is a 14-item tool that includes subjective mental well-being and functioning (Stewart-Brown & Janmohamed, 2008). Participants answered questions on a Likert scale ranging from 1 to 5 with the minimum overall score being 14 and the maximum 70.

The SF-12v2 survey instrument was also implemented in the current study as a validated self-report measure of physical and mental health. Participants provide responses for 12 questions on eight subscales: (1) physical functioning, role limitations due to (2) physical problems and (3) emotional problems, (4) bodily pain, (5) general health, (6) vitality, (7) social functioning and (8) mental health (Montazeri *et al.*, 2011). Scores can range from 0 to 100 with a higher score representing a better level of health (Ware *et al.*, 2005). It is possible to gain a score for each domain of self-reported health but the SF-12v2 can also provide two overall component scores: (1) physical health (PCS); and (2) mental health (MCS), which we use as outcome measures in the current study. The PCS is made up of the scores reported for physical functioning, role limitations due to physical problems, bodily pain and general health; and the MCS is calculated from the scores reported for vitality, social functioning, role limitations due to emotional problems and mental health.

Housing life events

The GoWell Community Health and Well-being Survey also included questions relating to housing SLEs. The questions that were considered to be of relevance in the current study asked about: (1) receipt of housing improvements (housing improvement since May 2008 (no/yes)); (2) whether the respondent had moved home since March 2008 (lived elsewhere/lived at this address in March 2008); and if so (3) if they had moved home voluntarily or involuntarily (moved for regeneration reasons as house was being demolished or refurbished). Thus, we use measures of three housing life events in the current study: housing improvements; voluntary move; involuntary move, all of which were coded dichotomously as either experienced or not.

Stressful (personal) life events

Following a review of previous literature, nine SLEs were considered to be relevant for inclusion in the current study as they relate to interpersonal, health and employment experiences (Bronselar *et al.*, 2008; Buckley *et al.*, 2010; Gallo *et al.*, 2006; Tamers *et al.*, 2014). The GoWell survey asked participants whether they had been affected in the last three years by a: (1) serious health event, illness or disability affecting you or another household member; (2) new job or promotion; (3) unemployment, redundancy or reduced working hours; (4) you or your partner became pregnant or you became a parent; (5) serious problem with or break-up of relationship with partner; (6) death of someone close; (7) marriage or setting up home with a partner; (8) being the victim of a crime; or (9) behavioural problem with a child at home or problem at school, for those with children; where someone did not have children, this life event was recorded as negative, i.e. not experienced. Each SLE was coded in the data set as dichotomous (no/yes).

Covariates

Socio-demographic controls applied in the current study were gender, age (16–24, 25–39, 40–54, 55–64 or 65+), ethnicity (British or non-British), education (none/Scottish Leaving Certificate or higher than Scottish Leaving Certificate) and household type (adult, single parent, two parent or older person).

Statistical analysis

Statistical analysis was performed using SPSS version 21. Data cleaning removed those individuals who refused or answered ‘don’t know’ to any of the SLE questions; in addition, several variables required transformation.

Descriptive analysis was performed firstly to determine the prevalence of each demographic variable of interest (gender, age, citizenship, education and household type) and secondly to establish the incidence of each housing and stressful (personal) SLEs among participants over the three year study period. SLEs were then summed in order to calculate the total number of SLEs that participants were affected by, over the three year period.

Subsequent to performing descriptive analysis, the mean and standard deviation (SD) were calculated for each of the three continuous outcome measures of health (SF-12 MCS; SF-12 PCS and WEMWBS) across the 12 SLEs. Independent t-tests were performed to determine whether the measures of health were statistically different dependent upon the occurrence of a SLE. *p* values <0.05 were considered significant.

In order to fulfil the third study aim, multivariate linear regressions were performed to determine the relationships between experiencing a SLE and the three physical and mental health and well-being outcomes for individuals. The first stage of the regression models included the five socio-demographic variables (age, gender, education, citizenship and household type) in order to control for their potential effects upon the three health outcomes. The second stage of the model enabled an assessment of the relationship between the three housing-related SLEs (housing improvements, involuntary move and voluntary move) and each of the health outcomes, taking the socio-demographic factors into account. The third stage of the models then included the additional effects of the nine personal SLEs (health event, new job, unemployment, parenthood, relationship break down, bereavement, marriage, victimisation and behavioural problems with a child) on the health outcomes. Three identical multivariate models were produced for each of the three health outcomes (SF-12 MCS, SF-12 PCS and WEMWBS).

Results

Demographic characteristics

Table 2 shows the demographic characteristics of respondents. Of the 4270 participants, 40.9% (*n* = 1748) were male and 59.1% (*n* = 2522) were female. Participants’ ages ranged from 16 years to 65+ with over 50% of participants aged 25–54 years. About 84.6% of the sample population classified themselves as British citizens with 65.4% having no higher than Scottish leaving certificates as their highest level of educational qualification. The majority of participants classified themselves as living in an adult household (45.4%). Other household categories were ‘older person’ (23.8), single parent (16.1%) and two parents (14.6%).

Table 2. Participant socio-demographic characteristics.

Characteristic	Category	<i>n</i> (%)
Gender	Male	1748 (40.9)
	Female	2522 (59.1)
Age	16–24	318 (7.4)
	25–39	1153 (27.0)
	40–54	1218 (28.5)
	55–64	603 (14.1)
	65+	978 (22.9)
Citizenship	British	3614 (84.6)
	Non-British	656 (15.4)
Education	None/SLC	2648 (65.4)
	>SLC	1402 (34.6)
Household type	Adult	1916 (45.4)
	Single parent	680 (16.1)
	Two parent	618 (14.6)
	Older person	1006 (23.8)

Note: SLC – Scottish leaving certificates.

Table 3. Health outcome measures.

		<i>n</i>	Mean	Std. Dev.
Mental health	SF-12 MCS	4122	49.89	11.72
Physical health	SF-12 PCS	4122	45.27	14.00
Mental well-being	WEMWBS	4093	50.52	10.45

Notes: SF-12 MCS – SF-12 Mental component score; SF-12 PCS – SF-12 Physical component score; WEMWBS – Warwick-Edinburgh mental well-being Score; Std. Dev. – Standard deviation.

Compared to the city population as a whole (see NRS, 2014), our sample of deprived area residents includes a higher number of older adults aged 65 or more (23% vs. 16% for the city); slightly more people from outside the UK (15% vs. 12%); and nearly twice as many single parent households with dependent children (16% vs. 9%).

Health outcomes

The mean values and SDs for the three health outcome measures are given in Table 3. For the study group as a whole, physical health is lower than mental health, with mean scores of 45.3 and 49.9, respectively. Elsewhere, we have reported a decline on several measures of physical health for our study group over time, with lower self-rated health in 2011 than found in the main national health survey conducted in the same year (Egan, Tannahill, *et al.*, 2013b). With regard to mental well-being, the average score in our study group, at 50.5, is just above the national average of 49.9 recorded in 2012 (Bromley *et al.*, 2013).

Occurrence of SLEs

The frequency of each SLE is presented in Table 4. Overall, the most frequent SLE experienced by study participants were ‘housing improvement’ and ‘voluntary move’, affecting a third of the sample, and ‘bereavement’ and a ‘health event’ which affected around a quarter of the sample. Three more SLE occurred in more than 10% of the sample: ‘involuntary move’,

Table 4. Incidence of life events over the three year period.

Life event	Yes	No
<i>Housing life events</i>		
Housing improvement	1496 (40.6)	2190 (59.4)
Involuntary move	479 (11.2)	3791 (88.8)
Voluntary move	1543 (36.1)	2727 (63.9)
<i>Personal life events</i>		
Health event	961 (23.0)	3215 (77.0)
New job or promotion	349 (8.3)	3838 (91.7)
Unemployed, redundancy or reduced hours	429 (10.3)	3756 (89.7)
Parenthood	421 (10.1)	3759 (89.9)
Relationship breakdown	247 (5.9)	3920 (94.1)
Bereavement	976 (23.6)	3167 (76.4)
Marriage	139 (3.3)	4025 (96.7)
Victimisation	288 (6.9)	3881 (93.1)
Behavioural problem with child	96 (2.3)	4148 (97.7)

Table 5. Cumulative number of life events experienced over the three year period.

Number of life events	Frequency (%)	Cumulative (%)
0	622 (17.5)	17.5
1	1118 (31.5)	49.0
2	922 (25.9)	74.9
3	523 (14.7)	89.6
4	248 (7.0)	96.6
5	76 (2.1)	98.7
6	36 (1.0)	99.7
7	9 (0.3)	100.0

‘unemployment’ and ‘parenthood’. The occurrences of SLEs such as ‘marriage’ and ‘behavioural problems with a child’ were very uncommon, having a less than 5% incidence rate.

The frequency of SLEs that affected the study sample ranged from 0 to a total of 7 SLEs, with a mode of 1 ($n = 1118$, 31.5%) (Table 4). Of those who took part in the current study, 17.5% ($n = 622$) did not experience a SLE over the three year period, whereas 57.4% of the study sample were found to experience 1–2 SLE and with around 10% experiencing 4 or more SLEs (Table 5).

Associations of life events with health and well-being outcomes: discrete analyses

Data presented in Table 6 depict the effect that each discrete SLE had on the health and mental well-being of participants (SF-12 MCS, SF-12 PCS and WEMWBS). All SLEs were found to have a significant effect on mental health (SF-12 MCS) with the exception of housing improvements, a voluntary move and marriage ($p > 0.05$). Eleven of the 12 SLEs were significantly associated with differences in physical health (SF-12 PCS), the exception being victimisation, where no such relationship existed. With regard to mental well-being (WEMWBS), 10 of the 12 SLEs were significantly associated with differences in the outcome, with only housing improvements and a voluntary move not being so related.

In terms of the direction of the effects, most of the SLEs behave as expected. Three SLE have positive associations with all three health outcomes, namely new job or promotion at work, parenthood and marriage. Four SLEs have negative associations with all three health



Table 6. Discrete analysis of stressful life events in relation to the health and well-being of the individual.

	SF-12 Mental component score						SF-12 Physical component score						Warwick-Edinburgh mental well-being score					
	Yes			No			Yes			No			Yes			No		
	<i>n</i>	Mean (SD)	<i>p</i> value	<i>n</i>	Mean (SD)	<i>p</i> value	<i>n</i>	Mean (SD)	<i>p</i> value	<i>n</i>	Mean (SD)	<i>p</i> value	<i>n</i>	Mean (SD)	<i>p</i> value	<i>n</i>	Mean (SD)	<i>p</i> value
Housing improvement	1443	49.74 (11.72)	0.282	2120	50.17 (11.67)	0.282	1443	43.37 (14.47)	0.000***	2120	45.10 (13.77)	0.000***	1438	50.15 (10.56)	0.000***	2102	50.83 (10.34)	0.057
Involuntary move	456	48.00 (12.59)	0.001**	3666	50.12 (11.59)	0.001**	456	43.71 (14.14)	0.013*	3666	45.47 (13.97)	0.013*	451	49.10 (10.83)	0.003**	3642	50.70 (10.39)	0.003**
Voluntary move	1480	49.81 (11.93)	0.772	2642	49.93 (11.60)	0.772	1480	47.48 (13.43)	0.000***	2642	44.03 (14.16)	0.000***	1452	50.41 (11.11)	0.000***	2641	50.58 (10.07)	0.624
Health event	927	44.28 (14.07)	0.000***	3141	51.53 (10.40)	0.000***	927	33.87 (14.56)	0.000***	3141	48.61 (11.94)	0.000***	920	44.61 (11.11)	0.000***	3130	52.28 (9.57)	0.000***
New job or promotion	338	53.28 (8.55)	0.000***	3737	49.59 (11.92)	0.000***	338	53.66 (6.52)	0.000***	3737	44.49 (14.27)	0.000***	342	55.59 (8.85)	0.000***	3716	50.07 (10.46)	0.000***
Unemployment	416	50.73 (10.53)	0.124	3657	49.79 (11.85)	0.124	416	49.76 (11.08)	0.000***	3657	44.73 (14.22)	0.000***	417	52.41 (10.28)	0.000***	3640	50.32 (10.44)	0.000***
Parenthood	416	51.67 (9.15)	0.000***	3655	49.68 (11.98)	0.000***	416	52.60 (8.71)	0.000***	3655	44.42 (14.26)	0.000***	405	52.57 (9.55)	0.000***	3649	50.32 (10.52)	0.000***
Break-up	241	44.34 (13.98)	0.000***	3817	50.24 (11.49)	0.000***	241	47.40 (13.32)	0.011*	3817	45.13 (14.05)	0.011*	243	47.11 (12.05)	0.000***	3798	50.77 (10.30)	0.000***
Bereavement	951	47.68 (13.15)	0.000***	3083	50.56 (11.17)	0.000***	951	42.54 (14.97)	0.000***	3083	46.09 (13.61)	0.000***	935	48.57 (11.67)	0.000***	3084	51.14 (10.01)	0.000***
Marriage	138	51.41 (10.00)	0.124	3918	49.85 (11.79)	0.124	138	50.94 (10.79)	0.000***	3918	45.07 (14.06)	0.000***	137	54.20 (9.61)	0.000***	3901	50.44 (10.45)	0.000***
Victimisation	280	41.99 (15.63)	0.000***	3779	50.47 (11.19)	0.000***	280	43.83 (14.35)	0.078	3779	45.36 (13.98)	0.078	277	45.31 (12.73)	0.000***	3766	50.93 (10.17)	0.000***
Behavioural child issue	95	44.72 (13.13)	0.000***	4008	50.01 (11.65)	0.000***	95	49.31 (12.48)	0.002**	4008	45.15 (14.03)	0.002**	94	47.46 (10.08)	0.004**	3981	50.59 (10.45)	0.004**

Note: SD – Standard Deviation.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 7. Results of multivariate linear regression for SF-12 Mental Component Score.

Predictors	Stage 1		Stage 2		Stage 3	
	B (SE)	B (SE)	<i>p</i> value	<i>p</i> value	B (SE)	<i>p</i> value
Gender ^a	-1.870 (0.409)	-1.872 (0.409)	0.000***	0.000***	-1.926 (0.394)	0.000***
Age group ^b	-0.242 (0.208)	-0.241 (0.210)	0.252	0.245	0.120 (0.221)	0.586
Education ^c	1.632 (0.452)	1.673 (0.454)	0.000***	0.000***	1.241 (0.445)	0.005**
Citizenship ^d	2.555 (0.632)	2.564 (0.634)	0.000***	0.000***	1.725 (0.618)	0.005**
Household structure ^e	1.945 (0.191)	1.922 (0.191)	0.000***	0.000***	1.577 (0.192)	0.000***
Housing improvement		-0.397 (0.410)	0.333		0.026 (0.392)	0.947
Involuntary move		-1.671 (0.779)	0.032*		-1.440 (0.747)	0.054
Voluntary move		-0.673 (0.443)	0.129		-0.429 (0.428)	0.316
Health event					-5.997 (0.471)	0.000***
New job or promotion					3.186 (0.749)	0.000***
Unemployment					1.153 (0.676)	0.088
Parenthood					0.255 (0.729)	0.727
Break-up					-3.482 (0.850)	0.000***
Bereavement					-0.794 (0.469)	0.091
Marriage					0.308 (1.131)	0.785
Victimisation					-5.592 (0.790)	0.000***
Behavioural child issue					-2.924 (1.278)	0.022*

Note: SD – Standard Deviation. SE – Standard error.

p* < 0.05; *p* < 0.01; ****p* < 0.001.

^aGender coded: males = 1 and females = 2.

^bAge group coded: 16–24 = 1, 25–39 = 2, 40–54 = 3, 55–64 = 4 and 65+ = 5.

^cEducation coded: none/Scottish Leaving Certificate = 1 and higher than Scottish Leaving Certificate = 2.

^dCitizenship coded: 1 = British and 2 = non-British.

^eHousehold structure coded: adult = 1, single parent = 2, two parents = 3 and older person = 4; SLE coded no = 0 and yes = 1.

outcomes: involuntary move, health event, bereavement and victimisation. Three SLEs have positive associations with physical health, but negative associations with mental health and mental well-being: voluntary move, relationship break-up and behavioural problems with children. Finally, two SLEs did not behave as expected: housing improvements were negatively associated with all three health outcomes; and unemployment was positively associated with all three health outcomes.

Multivariate analyses

Tables 7–9 present the results of multivariate linear regression models for SF-12 MCS, SF-12 PCS and WEMWBS, respectively. Results for the proportion of variance explained for each of the three scores showed that the first stages of the models accounted for 0.045 of the variance in the SF-12 MCS; 0.202 for SF-12 PCS and 0.053 for WEMWBS; stage one for each of the three health outcome measures were of the lowest proportion. In stage two of the models – which included housing events – the proportion of variance explained increased for each health outcome measure (SF-12 MCS = 0.047; SF-12 PCS = 0.205; and WEMWBS = 0.057). The final stage of the regression models – with the inclusion of personal life events – resulted in the greatest proportion of variance being explained for each measure (SF-12 MCS = 0.136; SF-12 PCS = 0.339; and WEMWBS = 0.151).

Table 8. Results of multivariate linear regression for SF-12 Physical Component Score.

Predictors	Stage 1		Stage 2		Stage 3	
	B (SE)	p value	B (SE)	p value	B (SE)	p value
Gender ^a	0.334 (0.456)	0.464	0.329 (0.456)	0.470	0.045 (0.420)	0.915
Age group ^b	-4.304 (0.232)	0.000***	-4.212 (0.234)	0.000***	-3.270 (0.235)	0.000***
Education ^c	3.729 (0.504)	0.000***	3.743 (0.505)	0.000***	2.805 (0.474)	0.000***
Citizenship ^d	4.121 (0.705)	0.000***	3.981 (0.706)	0.000***	3.180 (0.659)	0.000***
Household structure ^e	0.848 (0.213)	0.000***	0.803 (0.213)	0.000***	0.302 (0.205)	0.142
Housing improvement			-1.562 (0.456)	0.001**	-0.982 (0.419)	0.019*
Involuntary move			-0.884 (0.868)	0.308	-0.389 (0.797)	0.626
Voluntary move			0.216 (0.493)	0.661	0.520 (0.456)	0.254
Health event					-12.091 (0.502)	0.000***
New job or promotion					2.993 (0.798)	0.000***
Unemployment					1.303 (0.721)	0.071
Parenthood					0.425 (0.778)	0.585
Break-up					0.514 (0.907)	0.571
Bereavement					-0.673 (0.501)	0.179
Marriage					-0.433 (1.206)	0.720
Victimisation					-1.605 (0.842)	0.057
Behavioural child issue					2.577 (1.363)	0.059

Note: SE – Standard error.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

^aGender coded: males = 1 and females = 2.

^bAge group coded: 16–24 = 1, 25–39 = 2, 40–54 = 3, 55–64 = 4 and 65+ = 5.

^cEducation coded: non/Scottish leaving certificate = 1 and higher than Scottish leaving certificate = 2.

^dCitizenship coded: 1 = British and 2 = non-British.

^eHousehold structure coded: adult = 1, single parent = 2, two parents = 3 and older person = 4; SLE coded no = 0 and yes = 1.

Table 9. Results of multivariate linear regression for Warwick-Edinburgh Mental Well-Being Score.

Predictors	Stage 1		Stage 2		Stage 3	
	B (SE)	p value	B (SE)	p value	B (SE)	p value
Gender ^a	-0.766 (0.367)	0.037*	-0.768 (0.366)	0.036*	-0.731 (0.352)	0.038*
Age group ^b	-1.127 (0.186)	0.000***	-1.165 (0.188)	0.000***	-0.884 (0.196)	0.000***
Education ^c	3.167 (0.404)	0.000***	3.288 (0.405)	0.000***	2.755 (0.395)	0.000***
Citizenship ^d	1.988 (0.568)	0.000***	2.067 (0.569)	0.000***	1.404 (0.552)	0.011*
Household structure ^e	1.253 (0.171)	0.000***	1.233 (0.171)	0.000***	1.011 (0.172)	0.000***
Housing improvement			-0.539 (0.367)	0.142	-0.175 (0.350)	0.616
Involuntary move			-1.527 (0.696)	0.028*	-1.420 (0.665)	0.033*
Voluntary move			-1.350 (0.399)	0.001**	-1.146 (0.383)	0.003**
Health event					-5.883 (0.42)	0.000***
New job or promotion					3.570 (0.663)	0.000***
Unemployment					0.753 (0.603)	0.212
Parenthood					-1.193 (0.656)	0.069
Break-up					-2.472 (0.755)	0.001*
Bereavement					-0.760 (0.421)	0.071
Marriage					1.992 (1.020)	0.051
Victimisation					-4.001 (0.705)	0.000***
Behavioural child issue					-2.455 (1.144)	0.032*

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

^aGender coded: males = 1 and females = 2.

^bAge group coded: 16–24 = 1, 25–39 = 2, 40–54 = 3, 55–64 = 4 and 65+ = 5.

^cEducation coded: non/Scottish Leaving Certificate = 1 and higher than Scottish Leaving Certificate = 2.

^dCitizenship coded: 1 = British and 2 = non-British.

^eHousehold structure coded: adult = 1, single parent = 2, two parents = 3 and older person = 4.

SLE coded no = 0 and yes = 1.

Table 10. Housing and personal life events found to be significantly associated with health outcomes, in descending order of impact.

Physical health		Mental health		Mental well-being	
Health event	–ve	Health event	–ve	Health event	–ve
New job/promotion	+ve	Crime victimisation	–ve	Crime victimisation	–ve
Housing improvement	–ve	Relationship breakup	–ve	New job/promotion	+ve
		New job/promotion	+ve	Relationship breakup	–ve
		Child behaviour issue	–ve	Child behaviour issue	–ve
				Involuntary move	–ve
				Voluntary move	–ve

Mental health

From Table 7, we can see that several socio-demographic factors are associated with mental health (SF-12 MCS), with the strongest associations being that women have lower mental health and non-British citizens have higher mental health. All three housing life events are negatively associated with mental health, with the effects attenuated in stage 3, but only one of these relationships was statistically significant – involuntary move ($p < 0.05$). Five of the nine personal SLE are significantly associated with mental health in Stage 3 of the model. Getting a new job is positive for mental health, but having a problematic child, having a relationship breakdown, being a victim of a crime and experiencing a serious health event are all negative for mental health. In the case of the last two of these – a health event (–5.997) and victimisation (–5.592) – the effect of the SLE on mental health is substantial, equating to a reduction of half a SD on the SF-12 MCS score.

Physical health

Physical health declines with age and is higher for those with post-school educational qualifications and for non-British citizens (Table 8). Housing improvements are negatively associated with physical health (–1.562), but the effect is attenuated (–0.982) when other SLEs are taken into account. As one might expect, experiencing a serious health event has a substantial negative impact upon physical health (–12.091), whereas getting a new job or promotion improves physical health, though by a much lesser amount (+2.993).

Mental well-being

The effects of socio-demographic characteristics on mental well-being are more modest than they are for mental or physical health (Table 9). The strongest association is a positive effect of post-school educational qualifications upon mental well-being (+2.755). All three housing events have a negative association with mental well-being, though their effects are attenuated when other SLEs are taken into account. An involuntary move is associated with a reduction in the WEMWBS score of –1.420, a voluntary move results in a reduction of –1.146, and a housing improvement has a negative effect of –0.175. Five of the other SLEs are significantly associated with mental well-being outcomes for residents, with a sixth bordering significance. Four SLEs were negatively associated with WEMWBS scores: serious health event (–5.883), victimisation (–4.001), child behavioural problem (–2.455) and relationship break-up (–2.472). The first two of these are substantial impacts equivalent to

40–50% of a SD on the WEMWBS score. Conversely, getting a new job or promotion was associated with higher mental well-being (+3.570).

Discussion

We set out to consider the significance of housing-related life events for the health and well-being of residents, in the context of other, personal life events that may occur for people at the same time. This consideration of housing events in the context of people's lives is important for a number of reasons. First, the health effects of housing improvements have long been a subject of inquiry in housing studies, with one systematic review identifying the earliest intervention study dating from 1936 (Thomson *et al.*, 2001). In the UK, there have been several key periods when improvement of the existing housing stock has been a particular focus of public policy, such as under the regime of general improvement areas and housing action areas which sought to improve private sector housing in the 1970s (Thomas, 1986). At the present time, the social housing stock is subject to such attention, with all social housing in Scotland having to be improved to meet a minimum national standard by 2015, resulting in significant investment by social landlords (Communities Scotland, 2007). And yet, the most recent review of the research evidence concluded that in order to understand how housing improvements could have impacts upon health directly, or indirectly via the social determinants of health, we have to understand more about the contexts in which such improvements are implemented (Thomson *et al.*, 2013). In our view, this consideration of context must include not only the socio-economic conditions of the area in question, but also the personal context of the lives of the people concerned.

The focus of housing policy interventions which require the movement or relocation of residents from one area to another has also shifted over time from cases of private sector area renewal to social housing restructuring programmes, with the negative effects of 'forcible displacement' being reported for the former in both the UK (see Paris & Blackaby, 1979) and the USA (Gans, 1962; Jacobs, 1961). In the case of the present-day restructuring of social housing estates, Goetz (2002) showed that the outcomes from relocation varied between voluntary and involuntary movers, a distinction that may be influenced by other developments in people's lives. Further, a recent overview of relocation studies argued that it was difficult to make an overall judgement on the benefits and costs of relocation without taking into account what else is going on, and the impacts upon other domains of people's lives such as employment, health and social networks (Kleinhans & Kearns, 2013).

Thus, in the case of the two kinds of housing events that we are studying because they are occurring at a rapid rate in Glasgow – housing improvements and relocation – there are good a priori reasons for seeking to take into account the concurrent effects of other life events. Further, we fully recognise that a wide range of factors operating over the life course will impact upon residents' health (including the impact of living in a deprived area (King & Ogle, 2014), and we also appreciated from qualitative research we had undertaken with families undergoing relocation, that life events were a common occurrence among our deprived study population (Egan & Lawson, 2012). Indeed, in the current study, and in relation to our initial research question, we found that life events were fairly common, with a quarter of the study group experiencing three or more such events over a three year period, and one-in-ten experiencing four or more life events in three years.

The findings of our analyses of the concurrent impacts of housing and other life events upon residents' health and well-being are summarised in Table 10. Not surprisingly, the experience of a serious health event had the biggest impact on all three health outcome measures. The only other life event to affect all three outcomes (this time positively) was getting a job. Three life events were negatively associated with both the mental health and mental well-being outcome measures: being a victim of a crime, experiencing a relationship breakdown and coping with a behavioural problem with a child. It may, however, be the case that the personal SLE under investigation within the current study might, in other circumstances, have had even more damaging effects on health but for the 'toughness' and resilience of the individuals and communities concerned (Chaskin, 2008; Masten *et al.*, 1990; Seery, 2011). Previous research has suggested that individuals who experience a number of 'stressors' become well equipped to cope with stressful situations as they develop a 'toughness' following the occurrence of previous events (Seery, 2011). In addition, it has also been reported that living within a community may have the potential to increase an individual's level of resilience in turn facilitating recovery from a SLE (Chaskin, 2008; Masten *et al.*, 1990). We have not been able here to assess the extent of unrealised health impacts from SLE due to resilience factors.

In relation to housing life events results showed that they were negatively associated with two of the outcomes: housing moves (voluntary and involuntary) were negatively associated with mental well-being; and housing improvements were negatively associated with physical health. The latter finding may appear counter-intuitive, but is not surprising given what has been found previously in a number of UK studies of housing improvements that have used a similar health scale (SF-36) as the outcome measure. Critchley *et al.* (2004) found no significant changes in SF-36 sub-scales, including physical health sub-scales, after housing improvements delivered to an elderly study group. Barton *et al.* (2007) also found no significant differences in any of the SF-36 sub-scales between the intervention and control groups after housing improvements to a general population group. Evans & Layzell (2000) reported a reduction in the SF-36 physical function sub-scale after housing improvements, for both the intervention and control group in a general population study. The recent review of housing improvement studies concluded that although general health impacts tended to be positive, not all studies reported such improvements. Moreover, where housing improvements were delivered across an entire area, and not targeted according to individual need, the health impacts 'are less clear' (Thomson *et al.*, 2013, p. 62); these circumstances apply in the case of Glasgow's housing improvement programme.

The overall picture emerging from our study of life events among a deprived population group is as follows. Health events are fairly common, affecting over a fifth of the study group, and have the biggest negative effects on physical and mental health and on mental well-being. Crime victimisation has the next biggest negative effect on mental health and mental well-being, but is far less common than health events, affecting one-in-fourteen people in the study group. Similarly, relationship breakdown (which affects one-in-seventeen people in the study group) has a negative effect on mental health and mental well-being, though a lesser impact than victimisation. Getting a job has a substantial positive effect on all three health outcomes, but is not very common, affecting less than a 10th of the study group. Housing events affect a lot of people – over a third of the study group in the case

of housing improvements and voluntary moves; a 10th of the study group in the case of involuntary moves – but have quite small, negative effects on physical health (in the case of housing improvements) and on mental well-being (in the case of voluntary and involuntary moves). Thus, overall, housing-related life events appear less important for health impacts than other stressful, personal life events, which often have effects upon people which are 3–6 times larger than housing events. Finally, we have seen that the effects of housing events on health and well-being outcomes are indeed attenuated when other life events are included in the analysis, thus confirming our initial supposition that the impacts of housing-related events such as housing improvement and relocation can only be properly assessed when other SLEs are also accounted for.

Limitations

There are four limitations to our study. First, the evidence is cross-sectional, examining the associations of retrospectively reported life events upon current health status. A longitudinal study which estimated the occurrence of life events from reported changes in circumstances, and which examined health outcomes, controlling for baseline health status, would produce higher quality evidence. Second, our list of life events is neither comprehensive nor detailed enough. We have concentrated on those events most likely to affect our study group, although earlier constructions of life events scales included events in two other domains which we have not included here, namely social events and financial events (Snell-Dohrenwend *et al.*, 1978). In other work where we have been able to categorise housing improvements, we found that different works had different magnitudes of effect on health (Curl *et al.*, 2015), although here we are only able to use the occupant's recollection that housing improvements have taken place. We also accept that the division of a house move into two subcategories (voluntary and involuntary) and classification of an involuntary move by virtue of regeneration displacement may not be as straightforward as suggested in the current study; indeed, earlier work suggests that some of those who are forcibly moved may nonetheless view their move as voluntary and/or desirable (Kearns & Mason, 2013). Although as we do not have data reporting if the move was considered as negative/involuntary or positive/voluntary, this meant we were only able to subdivide house moves by the most conventional method possible.

Third, we have used general health scales as our outcome measures, albeit covering both physical and mental health, rather than looking at particular health conditions. We think this is appropriate for an examination of the impacts of a wide range of life events, but may underestimate the impacts of housing improvements on health, where for example improvements and deteriorations in a number of respiratory conditions have been reported in UK studies following housing improvements (Ambrose, 2000; Blackman *et al.*, 2001; Hopton & Hunt, 1996; Platt *et al.*, 2007; Shortt & Rugkåsa, 2007). Furthermore, we do not have an exact measure of the amount of time that has passed between the occurrence of life events and the date of survey; making it impossible to make assumptions regarding the intensity or duration of the experience on health. Our earlier work on housing improvements indicated that different kinds of works had health impacts at different time intervals but we could not replicate that type of analysis here (Curl *et al.*, 2015).

Implications for policy and practice

Our findings on the frequency and negative impacts of many life events suggest a need to develop plans for area regeneration from the outset and throughout with an interdisciplinary team including stakeholders who work within the fields of planning, health, crime and employment services, as well as residents who the programme of regeneration will influence. By doing so, this will ensure that a multi-faceted approach is taken to the programme of work and that residents will have a sense of 'control' (Allen, 2000) over programmes that either aim to reduce the incidence of negative events such as crime or to curtail the negative impacts of others such as common health events. Not surprisingly, a significant proportion of residents in deprived areas are also affected by family relationship issues, both between partners and between parents and children, so that family support services alongside health services are probably two of the most important people-based programmes that should be integrated into any area-based intervention programme in deprived areas.

Implementing a range of comprehensive community interventions, designed by a multi-disciplinary team, alongside and outlasting any regeneration work taking place in a community, will ensure that a source of support is available to residents who experience personal life events alongside housing and regeneration events. There are two other key reasons for doing this. First, it may help residents to make intended changes to their lives when they have their home improved or when they move to a new home – such as seeking training for employment, cutting down on smoking and taking more exercise – that they are currently often unable to realise, possibly due to other, unexpected events intervening (Bond *et al.*, 2013; Kearns & Mason, 2015). Second, an awareness of residents' recent experiences of life events, and their evaluation of their homes and neighbourhoods as contributory factors, would help avoid replicating conditions which individuals find problematic when relocating them to other homes as part of regeneration, and in so doing perpetuating or replicating negative impacts (Egan *et al.*, 2015).

Conclusion

Our findings are important for indicating how housing events which occur for people living in deprived circumstances might be better studied in future if frequent life events and changing personal circumstances are also simultaneously considered. But the findings also hold a crucial message for public policy, in particular indicating a need for holistic regeneration programmes (Breese, 2008) which as well as seeking to improve residents' housing circumstances and community environments through *in situ* improvements or relocation, also seek to support people through other life events which occur frequently, and which impinge upon their ability to benefit as much as they might from the physical changes being implemented. Some of the public services relevant to assisting people with these life events are increasingly involved in regeneration programmes, such as safety and employment services, but others are still not routinely engaged in regeneration partnerships, such as public health and family support services. The potential gain is not simply that support for people in other domains of their lives may prevent potential gains from housing and community improvements being diluted or lost, but that 'holistic, coherent approaches have the capability to produce inter-related outcomes' (Campbell, 2011; Taylor, 2008). In other words, positive interactions may flow in both directions between

housing-related events and other life events were the latter to be more positive than negative in nature at the same time.

Acknowledgements

This research was conducted as part of the Glasgow Community Health and Well-being (GoWell) Research and Learning Programme (www.gowellonline.com). GoWell is a collaborative partnership between the Glasgow Centre for Population Health, the University of Glasgow and the MRC/CSO Social & Public Health Sciences Unit. GoWell is sponsored by Glasgow Housing Association (Wheatley Group), the Scottish Government, NHS Health Scotland and NHS Greater Glasgow & Clyde. Claire Cleland and Anne Ellaway are funded by the UK Medical Research Council as part of the Neighbourhoods and Health Programme (MC_UU_12017/8).

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Glasgow Housing Association; NHS Greater Glasgow & Clyde; NHS Health Scotland; Scottish Government.

References

- Acevedo-Garcia, D., Osypuk, T. L., Werbel, R. E., Meara, E. R., Cutler, D. M. & Berkman, L. F. (2004) Does housing mobility policy improve health? *Housing Policy Debate*, 15(1), pp. 49–98.
- Allen, T. (2000) Housing renewal—doesn't it make you sick? *Housing Studies*, 15(3), pp. 443–461.
- Ambrose, P. (2000) *A Drop in the Ocean; The Health Gain from the Central Stepney SRB in the Context of National Health Inequalities* (Brighton: The Health and Social Policy Research Centre, University of Brighton).
- Atkinson, R., Thomson, H., Kearns, A. & Petticrew, M. (2006) Giving urban policy its 'medical': Assessing the place of health in area-based regeneration, *Policy & Politics*, 34, pp. 5–26.
- Barton, A., Basham, M., Foy, C., Buckingham, K. & Somerville, M. (2007) The watcombe housing study: The short term effect of improving housing conditions on the health of residents, *Journal of Epidemiology and Community Health*, 61(9), pp. 771–777.
- Beck, S., Hanlon, P., Tannahill, C., Crawford, F., Ogilvie, R. & Kearns, A. (2010) How will area regeneration impact on health? Learning from the GoWell study, *Public Health*, 124(3), pp. 125–130.
- Blackman, T., Harvey, J., Lawrence, M. & Simon, A. (2001) Neighbourhood renewal and health: Evidence from a local case study, *Health & Place*, 7(2), pp. 93–103.
- BMA (2003) *Housing and Health: Building for the Future* (London: BMA).
- Bond, L., Egan, M., Kearns, A., Clark, J. & Tannahill, C. (2013) Smoking and intention to quit in deprived areas of Glasgow: Is it related to housing improvements and neighbourhood regeneration because of improved mental health? *Journal of Epidemiology & Community Health*, 67(4), pp. 299–304.
- Bonnefoy, X. (2007) Inadequate housing and health: An overview, *International Journal of Environment and Pollution*, 30(3/4), pp. 411–429.
- Breese, R. (2008) Towards a holistic approach to regeneration: The importance of operational dimensions, *Journal of Urban Regeneration and Renewal*, 2(2), pp. 173–187.
- Bromley, C., Dowling, S., Gray, L., Hinchliffe, S., Hughes, T., Leyland, A., Mabelis, J., & Wardle, H. (2013) *The Scottish Health Survey 2012 Edition. Volume 1: Main Report* (Edinburgh: The Scottish Government).

- Bronselaer, J. L. J., De Koker, B. S. M. & Van Peer, C. M. A. (2008) The impact of divorce on the health status of ex-partners, *Arch Public Health*, 66, pp. 168–186.
- Buckley, T., McKinley, S., Tofler, G. & Bartrop, R. (2010) Cardiovascular risk in early bereavement: A literature review and proposed mechanisms, *International Journal of Nursing Studies*, 47(2), pp. 229–238.
- Campbell, P. (2011) *Community-Led Regeneration: A Review of Literature* (Edinburgh: Scottish Government).
- Cao, Y., Hwang, S. S. & Xi, J. (2012) Project-induced displacement, secondary stressors, and health, *Social Science and Medicine*, 74(7), pp. 1130–1138.
- Chaskin, R. (2008) Resilience, community, and resilient communities: Conditioning contexts and collective action, *Child Care in Practice*, 14(1), pp. 65–74.
- Clark, C., Myron, R., Stansfeld, S. & Candy, B. (2007) A systematic review of the evidence on the effect of the built and physical environment on mental health, *Journal of Public Mental Health*, 6(2), pp. 14–27.
- Clapham, D. (2002) Housing pathways: A post modern analytical framework, *Housing, Theory and Society*, 19(2), pp. 57–68.
- Communities Scotland (2007) *Scottish Housing Quality Standard: Progress Report* (Edinburgh: Communities Scotland).
- Cooper, H. L., Bonney, L. E., Ross, Z., Karnes, C., Hunter-Jones, J., Kelley, M. E. & Rothenberg, R. (2013) The aftermath of public housing relocation: Relationship to substance misuse, *Drug and Alcohol Dependence*, 133(1), pp. 37–44.
- Critchley, R., Gilbertson, J., Green, G. & Grimsley, M. (2004) *Housing Investment and Health in Liverpool* (Sheffield: CRESR, Sheffield-Hallam University).
- Curl, A. & Kearns, A. (2015) Financial difficulty and mental wellbeing in an age of austerity: The experience in deprived communities, *Social Policy and Society*, 14(2), pp. 217–240.
- Curl, A., Kearns, A., Mason, P., Egan, M., Tannahill, C. & Ellaway, A. (2015) Physical and mental health outcomes following housing improvements: Evidence from the GoWell study, *Journal of Epidemiology and Community Health*, 69, pp. 12–19.
- Dohrenwend, B. S. (1973) Social status and stressful life events, *Journal of Personality and Social Psychology*, 28, pp. 225–235.
- Dohrenwend, B. P. (2006) Inventorying stressful life events as risk factors for psychopathology: Toward resolution of the problem of intracategory variability, *Psychological Bulletin*, 132(3), pp. 477–495.
- Egan, M., Lawson, L., Kearns, A., Conway, E. & Neary, J. (2015) 'Neighbourhood demolition, relocation and health, A qualitative longitudinal study of housing-led urban regeneration in Glasgow, UK', *Health and Place*, 33, pp. 101–108.
- Egan, M., Katikireddi, S. V., Kearns, A., Tannahill, C., Kalacs, M. & Bond, L. (2013) Health effects of neighborhood demolition and housing improvement: A prospective controlled study of 2 natural experiments in urban renewal, *American Journal of Public Health*, 103(6), pp. 47–53.
- Egan, M. & Lawson, L. (2012) *Residents' Perspectives of Health and Its Social Contexts: Qualitative Findings from Three of Glasgow's Transformational Regeneration Areas* (Glasgow: GCPH).
- Egan, M., Tannahill, C., Bond, L., Kearns, A. & Mason, P. (2013) *Health Outcomes Over Time: A Comparison Across the 2006, 2008 and 2011 GoWell Community Surveys* (Glasgow: GCPH).
- Egan, M., Kearns, A., Mason, P., Tannahill, C., Bond, L., Coyle, J., Beck, S., Crawford, F., Hanlon, P., Lawson, L., McLean, J., Petticrew, M., Sautkina, E., Thomson, H. & Walsh, D. (2010) Protocol for a mixed methods study investigating the impact of investment in housing, regeneration and neighbourhood renewal on the health and wellbeing of residents: The GoWell programme, *BMC Medical Research Methodology*, 10(41).
- Ellaway, A. & Macintyre, S. (2000) Life events and localities: Are 'bad' life events associated with area of residence? IXth International Symposium in Medical Geography, Montreal, July 2000.
- Evans, G. W. & Kim, P. (2010) Multiple risk exposure as a potential explanatory mechanism for the socioeconomic status-health gradient, *Annals of the New York Academy of Sciences*, 1186, pp. 174–189.

- Evans, G., Wells, N. M. & Moch, A. (2003) Housing and mental health: A review of the evidence and a methodological and conceptual critique, *Journal of Social Issues*, 59(3), pp. 475–500.
- Evans, M. & Layzell, J. (2000) *The Effect of Housing Renewal on Health: the Riverside Project End of Grant Report* (Cardiff: University of Wales, College of Medicine).
- Fullilove, M. T. (1996) Psychiatric implications of displacement: Contributions from the psychology of place, *American Journal of Psychiatry*, 153(12), pp. 1516–1523.
- Gallo, W. T., Teng, H. M., Falba, T. A., Kasl, S. V., Krumholz, H. M. & Bradley, E. H. (2006) The impact of late career job loss on myocardial infarction and stroke: A 10 year follow up using the health and retirement survey, *Occupational and Environmental Medicine*, 63(10), pp. 683–687.
- Gans, H. J. (1962) *Urban Villagers: Group and Class in the Life of Italian-Americans* (New York: Free Press).
- Glasgow Housing Association (2005) *Regeneration Projects: Processes and Guidance Notes* (Glasgow: GHA).
- Goetz, E. (2002) Forced relocation vs. voluntary mobility: The effects of dispersal programmes on households, *Housing Studies*, 17(1), pp. 107–123.
- GoWell (2007) *Community Health and Wellbeing Survey: Baseline Findings 2006* (Glasgow: GCPH).
- Hanlon, P., Walsh, D. & Whyte, B. (2006) *Let Glasgow Flourish* (Glasgow: Glasgow Centre for Population Health).
- Hatch, S. L. & Dohrenwend, B. P. (2007) Distribution of traumatic and other stressful events by race/ethnicity, gender, SES, and age: A review of the research, *American Journal of Community Psychology*, 40, pp. 313–332.
- Holmes, T. H. & Rahe, R. H. (1967) The social readjustment rating scale, *Journal of Psychosomatic Research*, 11(2), pp. 213–218.
- Hopton, J. & Hunt, S. (1996) The health effects of improvements to housing: A longitudinal study, *Housing Studies*, 11(2), pp. 271–286.
- Jacobs, J. (1961) *The Death and Life of Great American Cities* (New York: Random House).
- Jelleyman, T. & Spencer, N. (2008) Residential mobility in childhood and health outcomes: A systematic review, *Journal of Epidemiology and Community Health*, 62(7), pp. 584–592.
- Kearns, A. & Mason, P. (2013) Defining and measuring displacement: Is relocation from restructured neighbourhoods always unwelcome and disruptive? *Housing Studies*, 28(2), pp. 177–204.
- Kearns, A. & Mason, P. (2015) Regeneration, relocation and health behaviours in deprived communities, *Health & Place*, 32, pp. 43–58.
- Kearns, A., Tannahill, C. & Bond, L. (2009) Regeneration and health: Conceptualising the connections, *Journal Urban Regeneration Renewal*, 3(1), pp. 56–76.
- Keene, D. E. & Geronimus, A. (2011) “Weathering” HOPE VI: The importance of evaluating the population health impact of public housing demolition and displacement, *Journal of Urban Health*, 88(3), pp. 417–435.
- Keene, D. E. & Ruel, E. (2012) ‘Everyone called me Grandma’: Public housing demolition and relocation among older adults in Atlanta, *Cities*, 35, pp. 359–364.
- King, K. & Ogle, C. (2014) Negative life vents vary by neighbourhood and mediate the relation between neighbourhood context and psychological well-being, *PLOS one*, 9(4).
- Kleinhans, R. & Kearns, A. (2013) Neighbourhood restructuring and residential relocation: Towards a balanced perspective on relocation processes and outcomes, *Housing Studies*, 28(2), pp. 163–176.
- Lantz, P. M., House, J. S., Mero, R. P. & Williams, D. R. (2005) Stress, life events, and socioeconomic disparities in health: Results from the Americans’ changing lives study, *Journal of Health and Social Behavior*, 46(3), pp. 274–288.
- Lelevrier, C. (2013) Forced relocation in France: How residential trajectories affect individual experiences, *Housing Studies*, 28(2), pp. 253–271.
- Marmot, M., Friel, S., Bell, R., Houweling, T. A. J. & Taylor, S. (2008) *Commission on Social Determinants of Health. Closing the Gap in a Generation: Health Equity Through Action on the Social Determinants of Health* (Geneva, Switzerland: World Health Organization).
- Marmot, M. (2011) *Fair Society, Healthy Lives. Strategic Review of Health Inequalities in England Post-2010* (London: UCL Institute for Health Equity).

- Masten, A. S., Best, K. M. & Garmezy, N. (1990) Resilience and development: Contributions from the study of children who overcome adversity, *Development and Psychopathology*, 2, pp. 425–444.
- Miller, G., Chen, E. & Cole, S. W. (2009) Health psychology: Developing biologically plausible models linking the social world and physical health, *Annual Review of Psychology*, 60, pp. 501–524.
- Montazeri, A., Vahdaninia, M., Mousavi, S. J., Asadi-Lari, M., Omidvari, S. & Tavousi, M. (2011) The 12-item medical outcomes study short form health survey version 2.0 (SF-12v2): A population based validation study from Tehran, Iran, *Health and Quality of Life Outcomes*, 9(12), pp. 1–12.
- Paris, C., Blackaby, B. (1979) *Not Much Improvement. Urban Renewal Policy in Birmingham* (London: Heinemann).
- Petticrew, M., Kearns, A., Mason, P. & Hoy, C. (2009) The SHARP study: A quantitative and qualitative evaluation of the short-term outcomes of housing and neighbourhood renewal, *BMC Public Health*, 9(415).
- Platt, S., Mitchell, R., Petticrew, M., Walker, J., Hopton, J., Martin, C., Corbet, J., Hope S. (2007) *The Scottish Executive Central Heating Programme: Assessing Impacts on Health. Research Findings 239* (Edinburgh: Scottish Executive, Social Research Development Department).
- Popay, J. (ed.) (2001) *Regeneration and Health: A Selected Review of Research* (London: Kings Fund).
- Schwarzer, R. & Schulz, U. (2002) The role of stressful life events, in: A. M. Nezu, C. M. Nezu & P. A. Geller (Eds) *Comprehensive Handbook of Psychology: Health Psychology*, pp. 27–49 (New York: Wiley).
- Seery, M. D. (2011) Resilience: A silver lining to experiencing adverse life events? *Current Directions in Psychological Science*, 20, pp. 390–394.
- Shortt, N. & Rugkåsa, J. (2007) “The walls were so damp and cold” fuel poverty and ill health in Northern Ireland: Results from a housing intervention, *Health & Place, Special Issue: Environmental Justice, Population Health, Critical Theory and GIS*, 13(1), pp. 99–110.
- Dohrenwend, B., Askenasy, A. R., Krasnoff, L. & Dohrenwend, B. (1978) Exemplification of a method for scaling life events: The peri life events scale, *Journal of Health and Social Behavior*, 19, pp. 205–229.
- Stewart-Brown, S. & Janmohamed, K. (2008) Warwick-Edinburgh mental well-being scale (WEMWBS): User guide version 1. in: J. Parkinson (ed.) (Edinburgh: NHS Health Scotland), pp. 1–32.
- Tamers, S.L., Okechukwu, C., Bohl, A.A., Guéguen, A., Goldberg, M. & Zins, M. (2014) The impact of stressful life events on excessive alcohol consumption in the French population: Findings from the GAZEL Cohort Study, *PLoS One*, 9.
- Taylor, M. (2008) *Transforming Disadvantaged Places: Effective Strategies for Places and People* (York: Joseph Rowntree Foundation).
- Thomas, A. D. (1986) *Housing and Urban Renewal: Residential Decay and Revitalisation in the Private Sector* (London: Allen & Unwin).
- Thomson, H., Atkinson, R., Kearns, A. & Petticrew, M. (2006) Do urban regeneration programmes improve public health and reduce health inequalities? A synthesis of the evidence from UK policy and practice (1980–2004), *Journal of Epidemiology and Community Health*, 60(2), pp. 108–115.
- Thomson, H., Petticrew, M. & Morrison, D. (2001) Health effects of housing improvement: Systematic review of intervention studies, *BMJ*, 323, pp. 187–190.
- Thomson, H., Thomas, S., Sellstrom, E. & Petticrew, M. (2013) *Housing Improvements for Health and Associated Socio-Economic Outcomes (Review)* (London: The Cochrane Collaboration/John Wiley & Sons Ltd).
- Thomson, H., Thomas, S., Sellstrom, E. & Petticrew, M. (2009) The health impacts of housing improvement: A systematic review of intervention studies from 1887 to 2007, *American Journal of Public Health*, 99(3), pp. 681–692.
- Turner, R.J. & Wheaton, B. (1997) Checklist measurement of stressful life events, in: S. Cohen, R. C. Kessler, L. U. Gordon (Eds) *Measuring Stress: A Guide for Health and Social Scientists*, pp. 29–58 (New York: Oxford University Press).
- Turner, S. (2008) *Health and Wellbeing in GoWell and Social Housing Areas in Glasgow* (Glasgow: GCPH).

- Umberson, D. (1992) Gender, marital status and the social control of health behavior, *Social Science & Medicine*, 34, pp. 907–917.
- Walsh, D. (2008) *Health and Wellbeing in Glasgow and the Go Well Areas – Deprivation based Analyses* (Glasgow: GCPH).
- Ware, J. E., Koninski, M., Turner-Bowker, D. M. & Gandek, B. (2005) *How to Score Version Two of the SF-12 Health Survey* (Lincoln, RI: Quality Metric Incorporated).
- WHO Commission on Social Determinants of Health (2008) *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health* (Geneva: World Health Organization).