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The general and mental health of movers to more- and less-disadvantaged socio-economic and physical environments within the UK

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Title:

The general and mental health of movers to more- and less-disadvantaged socio-economic and physical environments within the UK

Authors:

Helena Tunstall[1]

Richard Mitchell[2]

Jamie Pearce[1]

Niamh Shortt[1]

[1]University of Edinburgh

[2]University of Glasgow

Corresponding author:

Helena Tunstall

Email: Helena.Tunstall@ed.ac.uk

Telephone: +44 (0)131 6502 800

Fax: +44 (0)131 650 2524

Abstract

Residential mobility may play an important role in influencing both individual health, by determining individual exposures to environments, and area health, by shaping area population composition. This study is the first analysis of migration within the UK to compare general and mental health among adults by age group and consider moves between neighbourhoods with different levels of both socio-economic and physical environment disadvantage. The analysis assesses 122,570 cases from the annual British Household Panel Survey, 1996-2006, based upon pooled data describing moves between consecutive waves of the survey. It assesses the rates and binary logistic regression model odds of self-reported general health and mental health problems of movers and stayers by age group. It also compares movers between Census Area Statistics wards in the UK with different levels of Carstairs and Multiple Environmental Deprivation Index (MEDIx) scores. At all ages, movers had similar or higher odds of poor general and mental health relative to non-movers. Risk of mental health problems were particularly elevated among movers and remained significant after adjustment for socio-demographic variables in most age groups. In adjusted analysis of all adults odds of poor general and mental health were most elevated among movers to more socio-economically deprived areas, with the highest odds for mental health (1.54 95% CI 1.27-1.86). In contrast, risk of poor mental health among total adults was greatest among movers to better physical environments (1.40 95% CI 1.16-1.70). This study therefore finds little evidence of 'healthy migrant effects' among recent movers within the UK and suggests movers have particularly elevated risk of mental health problems. It also indicates that selective migration may not contribute to poor health found in UK neighbourhoods with multiple physical environment deprivation. Further analysis should explore why people with mental health problems are more likely to move to socio-economically deprived neighbourhoods.

Research Highlights:

- 'Healthy migrant theory' suggests that mobility is selective for good health.

- Analysis of moves within UK found movers at most ages didn't have better health.

- Movers' odds of poor health were more elevated for mental than general health.

- Mental health was worst among movers to more socio-economically deprived areas.

- Movers to less deprived physical environments also had poor mental health.

Introduction

Selective migration is commonly believed to have an important influence upon both individual health, by determining individual exposures to environments, and area health, by shaping area population composition (Boyle, 2004; Rogerson & Han, 2002; Spallek, Zeeb, & Razum, 2011). However, research regarding the health of migrants, and how their selection relates to the characteristics of areas they move between, has neglected some types of health outcomes and environments. This study uses British Household Panel Survey (BHPS) data to describe the relationship between individual health and residential mobility between neighbourhoods in UK. The analysis builds upon previous research in the UK firstly, by comparing the general and mental health of migrants of different ages and secondly, by assessing moves between neighbourhoods with different levels of both socio-economic and physical environment deprivation.

Individual health status and migration selectivity

'Healthy migrant theory' suggests migrants have better health than non-movers (Urquia & Gagnon, 2011). Much of the evidence supporting this healthy migrant effect has originated from research into the health of international migrants. For example, a number of studies have demonstrated that immigrants of Latino origin in the United States, and Turkish and Moroccan origin in France and Germany, have low death rates compared to native-born populations, despite their low levels of education and income (Khlat & Darmon, 2003; Ruiz, Steffen, & Smith, 2013). It has been proposed that this occurs in part due to selection; both direct health selection if health status itself supports the ability to move and/or indirect selection if material, educational and occupational circumstances required to make a move are associated with better health. However, research that has compared the health of international immigrants to populations in their country of origin has produced mixed results

(Landale, Gorman, & Oropesa, 2006; Marmot, Adelstein, & Bulusu, 1984; Rubalcava, Teruel, Thomas, & Goldman, 2008; Salmond, Joseph, Prior, Stanley, & Wessen, 1985).

Studies of *internal* migrants further emphasise a complex picture of migrant health. Whilst movers as a whole within the UK have better health than non-movers (Champion, 2005) research completed in developed countries indicates that a number of types of movers have poor health (Bentham, 1988; Cole et al., 2006; Evandrou, Falkingham, & Green, 2010; Jelleyman & Spencer, 2008; Larson, Bell, & Young, 2004; Martikainen, Sipilä, Blomgren, & van Lenthe, 2008; Norman, Boyle, & Rees, 2005; Tunstall, Cabieses, & Shaw, 2012; Tunstall, Pickett, & Johnsen, 2010; Verheij, Van de Mheen, de Bakker, Groenewegen, & Mackenbach, 1998). These groups include pregnant women, mothers and their infants and young children, people in mid-life and old age, frequent movers, people moving short distances, and those moving due to negative life circumstances.

The relationship between propensity to migrate, health and *age* may be particularly important in understanding the healthy migrant effect. In the UK, young adults are much more likely than other age groups to have moved within the country in the previous year, and then rates of mobility among adults decline through mid-life to reach their lowest levels in old age (Bailey & Livingston, 2005; Champion, 2005). Most studies from Europe, Australia and USA indicate that young adult movers are more likely to have good health than those who do not migrate, but by midlife or older ages movers are more likely to have *worse* health than non-movers (Bentham, 1988; Evandrou, et al., 2010; Larson, et al., 2004; Martikainen, et al., 2008; Norman, et al., 2005; Verheij, et al., 1998).

The relatively good health of movers at younger ages may reflect their socio-economic characteristics rather than a direct relationship with health status. In the UK, exceptionally high rates of mobility among young adults are driven, in part, by moves related to higher education, which remains selective for higher socio-economic position (Bailey &

Livingston, 2005; Champion, 2005). In contrast, research assessing mothers and their infants and children has found both lower socio-economic status and poorer health among those that were more residentially mobile (Jelleyman & Spencer, 2008; Tunstall, et al., 2012; Tunstall, et al., 2010). It has been suggested that the socio-demographic characteristics of younger movers can explain virtually all differences in their health (Jongeneel-Grimen, Droomers, Stronks, & Kunst, 2011). In contrast, the possibility that poor health is directly related to mobility in mid-life and old age has been supported by studies which have found that this association persists after adjustment for socio-demographic factors (Evandrou, et al., 2010; Halliday & Kimmitt, 2008; Larson, et al., 2004).

Research that has assessed how *change* in health status is related to mobility may provide stronger evidence of direct health selection. A longitudinal study of migrant health in the USA demonstrated that changes in health conditions were unrelated to propensity to move at ages under 45 years, but at older ages the advent of poor health was associated with mobility (Findley, 1988). A UK study of people aged over 50 years found rates of migration were elevated among people experiencing both improvements and declines in general health status (Evandrou, et al., 2010). The relationship between migration and health status is however likely to vary between health outcomes. New acute health problems may increase propensity to move while some chronic health problems could discourage mobility (Boyle, Norman, & Rees, 2002). Most studies of the health characteristics of movers within the UK have only considered broad measures of morbidity and mortality (Bentham, 1988; Connolly & O'Reilly, 2007; Norman, et al., 2005). Notably, studies that have considered mental health have indicated that there are high rates of mobility among people with severe mental illness (Tulloch, Fearon, & David, 2011; Tulloch, Fearon, Fahy, & David, 2010). Analysis of psychiatric inpatients in the UK has found residential moves were concentrated in the time

period immediately following discharge indicating that severe mental illness can be a direct cause of residential instability (Tulloch, et al., 2011).

Overall, this evidence has led to the suggestion that the image of migrants as healthy adults moving to take advantage of opportunities may largely represent a 'myth' which is unrepresentative of the experience of many internal migrants (Larson, et al., 2004). Evidence for direct health selection of internal migrants is stronger among older age groups. However, amongst these groups internal migration may be associated with poor health. For the population as a whole, evidence that direct selection for good health underlies the propensity to move is quite weak. This suggests therefore that a central part of the healthy migrant hypothesis may not apply to migration within countries (Urquia & Gagnon, 2011).

Moves to healthy and unhealthy environments

Migration itself may affect individual health by shaping exposure to relatively better or worse social and physical environments (Spallek, et al., 2011). Residential moves within the UK have in recent decades been disproportionately towards more socio-economically advantaged and rural environments, except among young adults (Bailey & Livingston, 2007; Champion, 2001). There are also associations between the characteristics of migrants and their environments of origin and destination. Migrants in the UK and Europe who move towards more socio-economically deprived neighbourhoods generally have worse self-rated heath and health-related behaviour and higher mortality than those moving towards less deprived areas (Connolly & O'Reilly, 2007; Martikainen, et al., 2008; Norman, et al., 2005; Tunstall, et al., 2012; van Lenthe, Martikainen, & Mackenbach, 2007). The limited research that has compared indicators of mental distress and illness to those of general and physical health, analysing mothers of young children in the UK (Tunstall, et al., 2012) and adults aged 16-54 years in Canada (Curtis, Setia, & Quesnel-Vallee, 2009), has indicated that poor

mental health may be particularly strongly associated with moves to more socio-economically deprived areas.

These socio-spatial patterns suggest that migration may contribute to the accumulation of poor health among unhealthy individuals. However, there is evidence that the relationship between neighbourhood health, area socio-economic deprivation and migration may vary with degree of deprivation and individual age (Connolly & O'Reilly, 2007; Jongeneel-Grimen, Droomers, Stronks, van Oers, & Kunst, 2013; Martikainen, et al., 2008; Norman & Boyle, 2014; Norman, et al., 2005; Tunstall, et al., 2012; van Lenthe, et al., 2007). In addition, research exploring the relationships between migration, health and the characteristics of the origin and destination area has largely focused on area socio-economic status. Other area characteristics have rarely been considered, in particular, physical environment, despite a wealth of evidence that factors such as climate, air pollution, and proximity to polluting industry may affect health (Richardson, Mitchell, Shortt, Pearce, & Dawson, 2010).

Environmental justice research has focused upon assessing the greater exposure of disadvantaged populations to hazardous physical environments (Been & Gupta, 1997). However, relatively few studies have explored whether socially selective migration can account for these disproportionate environmental burdens. Longitudinal analyses that has assessed changes in the aggregate social composition of populations following the siting of hazardous waste storage and disposal facilities have mostly found little evidence of increases in social inequalities (Been & Gupta, 1997; Cameron & McConnaha, 2006; Morello-Frosch, Pastor Jr, Porras, & Sadd, 2002; Oakes, Anderton, & Anderson, 1996; Pastor, Sadd, & Hipp, 2001; Richardson, Shortt, & Mitchell, 2010; Shaikh & Loomis, 1999). However, recent studies that have directly assessed patterns of migration have produced stronger evidence that

selective mobility increases social inequalities in exposure to environmental hazards

(Banzhaf & Walsh, 2008; Crowder & Downey, 2010; Depro, Timmins, & O'Neil, 2012;

Gawande, Bohara, Berrens, & Wang, 2000; Shumway, Otterstrom, & Glavac, 2014).

In summary, evidence suggests that people moving within a country have distinctive

health characteristics but relationships between health, migration and the characteristics of

places of origin and destination may vary by age and health outcome. There is evidence that

people in poor health, especially poor mental health, are more likely to move to socio-

economically deprived areas, which may contribute to the accumulation of further heath

disadvantage. However, there is currently little evidence about relationships between migrant

health and the physical environmental characteristics of their areas of origin and destination.

This study sought to address these gaps in our understanding.

We had the following research questions:

- Are there differences in the general and mental health status of movers and non-
  movers?

- How does health status vary between people that move to more and less deprived
  neighbourhoods?

- How do these relationships vary between socio-economically and physical
  environmentally disadvantaged neighbourhoods?

- Do differences in the health status of mover groups reflect their individual socio-
  demographic characteristics?

- How do these relationships vary with age?

Methods

British Household Panel Survey (BHPS)

The analysis used data from the BHPS, an annual longitudinal survey, completed 1991-2008, which described the socio-demographic characteristics, economic activity and personal relationships of adult residents in the UK (Taylor, Brice, Buck, & Prentice-Lane, 2010). The survey also contains a range of health and residential mobility outcomes. The 'original sample' of the BHPS included approximately 5,500 private households in England, Wales and Scotland containing 10,000 individuals. The survey was expanded to include additional 'new sample' members in Scotland and Wales in 1999 and Northern Ireland in 2001. Respondents from the UK European Community Household Panel (ECHP) were also incorporated in the survey during 1997-2001.

The BHPS defined all sampled members of the survey and their children as 'original sample members' (OSMs). The survey followed all OSMs that moved within UK to either private households or institutions, unless they moved into prison or were too frail or unwell to interview. Co-residents joining an OSM's household became 'temporary sample members' (TSMs) but were not followed if they moved out of the household shared with the OSM, unless they were the parent of an OSM.

Study sample and time period

This study analysed BHPS data from 1996-2006 (Waves 6-16) including OSMs and TSMs from the 'original sample', 'new samples' and the ECHP sample 1997-2000 (excluding ECHP Northern Ireland members). The BHPS data used in this study therefore contains respondents sampled from wards within Britain only for the years 1996-2000 and respondents sampled in Britain and Northern Ireland during 2001-2006.

The time period of 1996-2006 was selected to coincide with that of the neighbourhood measures used in the analysis. The study considered moves between adjacent waves of the BHPS during this period. Data describing ten sub-sets of mobility between survey waves, at 'Time 1' and 'Time 2', one year apart (1996-1997, 1997-1998…. 2005-2006) were pooled in the analysis. A similar approach to pooling data has been adopted in several previous studies of mobility using the BHPS to increase numbers of moves (Evandrou, et al., 2010; Nowok, van Ham, Findlay, & Gayle, 2013; Rabe & Taylor, 2010). As a consequence of pooling most survey respondents appear multiple times amongst the total observations in the dataset.

Defining movers

Individual 'movers' were people who changed residential address, one or more times, during the one year time period between adjacent waves of the BHPS. 'Stayers' were people that did not move between survey waves. Mover status was identified using data from a derived 'individual mover status' variable and a question regarding time at current address.

Defining moves to more and less disadvantaged neighbourhoods

The residential neighbourhoods of BHPS members were defined by their Census Area Statistics (CAS) ward. In 2001 UK CAS wards (n=10,654) contained populations of approximately 6,000. These areal units are large enough to contain much of the socio-economic and physical environment in which daily activity takes place and yet sufficiently small to capture changes in environment that result from many moves over short distances.

The socio-economic and physical environments of CAS wards in the UK were defined using the 2001 Carstairs Index and the Multiple Environmental Deprivation Index (MEDIx) respectively. The Carstairs Index is a widely used indicator of socioeconomic deprivation based on four measures from the Census (male unemployment, overcrowded households, no car households and low social class) (Carstairs & Morris, 1989). CAS wards

were categorised into deprivation quintiles according to their Carstairs score. MEDIx is based upon five aspects of the physical environment which are related to health in the UK (Pearce, Richardson, Mitchell, & Shortt, 2010; Richardson, Mitchell, et al., 2010; Richardson, Mitchell, Shortt, Pearce, & Dawson, 2009): air pollution (SO2, PM10, NO2 and CO), cold temperature, proximity to industrial facilities (waste management or metal processing or production sites), ultraviolet B radiation and the proportional coverage of green space. Data for these measures span the time period 1991-2006. Wards in the highest quintile of each of these indicators were scored +1 for pathogenic dimensions (air pollution, cold temperature and industrial facilities) and -1 for salutogenic dimensions (ultraviolet B radiation and green space). These scores were summed for each ward creating a six-point scale -2 (least deprived), -1, 0, 1, 2 and 3 (most deprived). In this analysis the two categories defining the least (-2 and -1) and most deprived environments (2 and 3) were combined due to small numbers in the extreme categories. Moves were defined as improving or worsening an individual's health environment according to whether respondents relocated to neighbourhoods with greater or lesser levels of socio-economic or physical environmental disadvantage.

Defining health status

General and mental health were defined by self-assessed measures at Time 1 preceding the move. General health status was captured at all waves of the BHPS but the question wording varied. At Waves 6-8 and 10-16 respondents were asked "Compared to people of your own age, would you say your health over the last 12 months on the whole has been: excellent, good, fair, poor, very poor?" However, at Wave 9, the survey question was "In general, would you say your health is: excellent, very good, good, fair, poor?" In this analysis the health status classifications from these two questions were combined into

dichotomous categories 'good' (combining 'excellent', 'very good' and 'good') and 'poor' (combining 'fair', 'poor' and 'very poor').

Respondents were also asked at all waves "Do you have any of the health problems or disabilities listed on this card?" One of the listed problems was "anxiety, depression or bad nerves, psychiatric problems". Respondents could reply to the question either 'yes' or 'no'. This measure was selected to define mental health because it was likely predominantly to identify acute mental distress and illness rather than the small, temporary changes in well-being that may commonly be associated with residential relocation.

Age group stratification

The analysis included adults aged 18 years and over. It was stratified by age groups 18-29, 30-39, 40-49, 50-59, 60-69, 70 and over. These age groups were selected to represent periods of the life course with different health risk, propensity to move and spatial patterns of mobility.

Socio-demographic adjustment variables

The socio-demographic variables were intended to identify factors related to health status or propensity to move which may confound the relationship between health status and migration (Bailey & Livingston, 2005; Marmot & Wilkinson, 2006). They were 'five year' age group (18-24; 25-29; 30-34….. 80-84; 85-89; 90+ years), sex (male; female), marital status (married; living as couple; divorced; separated; never married), household type (single; couple no children; couple with dependent children; couple with non-dependent children; lone parent with dependent children; lone parent with non-dependent children; 2+ unrelated adults, other), housing tenure (owner occupier; local authority or housing association rented; privately rented; missing or other), highest educational qualification (degree or diploma; A level; O level or CSE; none of these; missing) and Registrar General's social class

(professional; managerial and technical; skilled non-manual; skilled manual; partly skilled; unskilled; never worked; missing or other), as measured at Time 1.

Analytic strategy

The health status of movers and stayers, and movers to more and less deprived environments, were compared and their differences assessed using Pearson Chi-square tests. Logistic regression was then used to compare the same relationships adjusting for potential socio-demographic confounders. In these models health status was the dependent variable and mover status was the independent variable. Analyses were carried out for all ages combined and stratified by age group. All counts presented are un-weighted. Percentages and odds ratios were weighted using BHPS all UK cross-sectional enumerated individuals' weights for the Time 1 Wave which adjusted for sample design and non-response (Taylor, et al., 2010). The analysis was completed in Stata 12.1.

Results

'Case' numbers describe total observations in the pooled dataset 1996-2006. Among the 138,109 BHPS respondents at Time 1, 125,916 (91.2%) also participated at the next wave at Time 2. From this group of cases 3,346 were excluded because of missing data for age (N=5), marital status (N=26), general health status (N=320), mental health problems (N=831), weights (N=1,627), CAS ward at Time 1 (N=184), CAS ward at Time 2 (N=200) or because of inconsistent data for movers status and CAS ward of residence (N=396), retaining 122,570 cases in the analysis. These excluded cases were comprised disproportionately of younger adults aged 18-39 years. The 122,570 cases in the analysis were based upon survey responses from 21,328 unique individuals over the ten pairs of survey waves.

Frequency of mobility and move types

The rate of migration between waves of the BHPS was 8.5% among all age groups combined. Mobility was greatest among young adults aged 18-29 years at 23.3%, halving to

10.6% at 30-39 years, halving again to 5.5% at ages 40-49 years and gradually declining

further in older age groups to reach the lowest level of 3.1% among people aged 70 years and

older (Table 1). Among total migrants the majority of moves were to wards in a different

Carstairs quintile of socio-economic deprivation, but within the same MEDIx category of

physical environmental deprivation (Table 1). Movers aged 18-29 years were the most likely

to have moved to areas with different levels of socio-economic and physical environmental

deprivation (13.0 % and 8.2% of the total age group respectively). In all age groups, with the

exception of those aged 18-29 years, a greater proportion of moves between areas with

different levels of deprivation were to wards with lower levels of socio-economic and

physical environmental deprivation.

Health status of movers and stayers

Comparing rates of poor health between movers and stayers of all ages combined

showed that movers had significantly lower rates of poor general health (Table 2, movers:

27.0%; stayers: 30.2%) but had higher rates of mental health problems (Table 3, movers:

8.5%; stayers: 7.6%). However, when these relationships were stratified by age, little

evidence of a healthy migrant pattern remained within any age group. At all ages, movers

either had higher rates of poor general health than stayers or there was no significant

difference between the two (Table 2). Movers also had significantly higher rates of mental

health problems compared to stayers in all age groups apart from those aged 30-39 for whom

there was no significant difference (Table 3).

Logistic regression models of the odds of poor general health and poor mental health

among movers relative to stayers (Table 4) demonstrates that in all age groups, except 70+

years, the unadjusted odds of mental health problems were more elevated among movers than

odds of poor general health. The odds of poor general health among movers were most elevated at age 70+ years, while odds of mental health problems were most highly elevated at ages 40-49, 50-59, 60-69, and 70+ years.

For people of all ages, combined adjustment for age and other socio-demographic characteristics increased the odds of poor general and mental health for those who moved relative to those who did not to 1.09 (95% CI 1.02-1.17) and 1.25 (95% CI 1.13-1.38) respectively (Table 4). However, when results were stratified by age adjustment for socio-demographic variables reduced the odds of poor general and mental health of movers relative to stayers in all age groups, with the exception of poor general health at ages 70+ years and mental health problems at ages 60-69 years. The greatest reduction in odds ratios following adjustment was among those aged 40-49 and 50-59 years. Following adjustment, odds of poor general health were still significantly elevated among movers aged 18-29 and 70+ years. Adjusted odds of poor mental health were more elevated than those for general health in all age groups, except 70+, and were significantly elevated at all ages except 30-39 years. In the adjusted models, poor health among movers was most elevated at age 70+ for both poor general and mental health.

Comparison of health status between movers to more and less disadvantaged areas

For all ages combined, comparison of rates of general health status between movers to more, less and similarly socio-economically deprived areas found significant differences (Table 2). Those moving to the same level of socio-economic deprivation had worst health, those moving to a more deprived quintile next worse, and those moving to a less deprived quintile had the best health. There were no significant differences in poor general health when considering moves within and between MEDIx categories. Mental health differences between mover types were not significant (Table 3), but those moving to more deprived

socio-economic quintiles and less deprived MEDIx categories were most likely to report mental health problems.

When results were stratified by age group, there were significant differences in the rates of poor general health between those moving to similar, more or less socio-economically deprived areas in age group 50-59 years only (Table 2). In this age group rates of poor general health were greatest amongst those moving within a Carstairs quintile. Significant differences in the rate of poor general health between those moving to similar, more or less physically environmentally deprived areas were seen in the age groups 50-59 years and 60-69 years. At ages 50-59 and 60-69 years poor general health was highest among those moving within a MEDIx category. For mental health problems, stratification by age group showed significant differences between those moving to similar, more or less socio-economically deprived areas at age 40-49 years. At this age movers to more socio-economically deprived quintiles had higher rates of poor mental health. There were no significant differences in poor mental health between movers to similar, more or less physically environmentally deprived areas.

The adjusted odds of reporting poor general and mental health among Carstairs mover types of all ages combined, relative to stayers, were highest among those who moved to a more deprived environment and were also significantly higher among movers to a similar environment, but not significantly different among those moving to a less deprived area (Tables 5 and 6). The odds of poor health were most elevated among movers to more socio-economically deprived areas for mental health problems (1.54 95% CI 1.27-1.86). For physical environmental deprivation, the adjusted odds of poor general health for total people were significantly higher among those moving to a similar ward, but not significantly different among other mover types. The adjusted odds of poor mental health among people of all ages were also significantly higher among those moving to the same or a more physically

deprived category compared to stayers, but surprisingly were highest among those moving to a *less* deprived category (1.40, 95% CI 1.16-1.70).

When considering these results stratified by age group (Tables 5 and 6) adjustment of models for socio-demographic characteristics reduced the odds of poor general and mental health in most age groups among most types of movers, with particularly large reductions among movers within Carstairs quintiles and MEDIx categories. A notable exception to this pattern was the odds of poor health among movers aged 18-29 years to more socio-economically and physical environmentally deprived areas, which increased following adjustment.

Differences between age groups in results from the adjusted models for poor general health were mixed and complex (Table 5). Among 18-29 year olds moving to a more socio-economically deprived environment was associated with a significantly higher risk of poor general health, relative to stayers. No significant differences in young adult's risk of poor general health between stayers and movers physical environment categories remained after adjustment. At ages 30-49 years there was no consistent evidence of significant differences, after adjustment, in the risk of poor general health between stayers and movers of any kind, whether environment was defined socio-economically or physically. For the age group 50-59 years in the adjusted models there were no significant differences in odds of poor general health among the Carstairs mover groups but there was significantly *lower* odds of poor general health among movers to *more* deprived MEDIx categories relative to stayers. For age group 60-69 years adjusted odds of poor general health among the mover groups were again not significantly different from stayers. Results were distinctive for those aged 70+ years amongst whom the risk of poor general health was highest and significant for those moving to more deprived environments, whether defined socio-economically or physically. Moving

within a quintile or category was also associated at this age with significantly higher risk of poor general health.

Results from the adjusted models for mental health problems stratified by age group (Table 6) suggest that in all age groups, the odds of poor mental health were greatest relative to stayers among those moving to more socio-economically deprived wards, although these results were only statistically significant at ages 18-29, 40-49 and 70+ years. In contrast, adjusted odds of poor mental health among MEDIx groups were greatest among those moving to *less* physically environmentally deprived areas at all ages except 30-39 and 60-69 years and were significantly elevated at ages 18-29 years, 50-59 years and 70+ years. At age 60-69 years odds of poor mental health were greatest, and significantly elevated, among those moving between areas with the same level of physical environment deprivation.

Discussion

This study extends understanding of the health status of migrants by comparing the general and mental health of movers and non-movers of different ages, and by characterising the level of deprivation in origin and destination areas in two ways: socio-economically and physically. The study found little evidence of the 'healthy migrant effect' indicating instead that, in general, movers had similar or higher rates of poor health than non-movers. Mental health problems were more elevated among movers and, for people of all ages combined, remained elevated after adjustment for movers' socio-demographic characteristics. Adjusted risk of mental health problems was particularly high among those moving to more socio-economically deprived and less physical environmentally deprived areas.

The poor health of young and old movers

Previous research has suggested that compared to non-movers, mobile young adults have good health but adult movers in mid-life and old age are likely to have poor health (Bentham, 1988; Evandrou, et al., 2010; Larson, et al., 2004; Martikainen, et al., 2008;

Norman, et al., 2005; Verheij, et al., 1998). Consistent with these findings the most elevated rates of poor health in this study were found among older movers in the age group 70+ years for general health, and in age groups 40+ for poor mental health. However, this study also found similar or higher rates of poor health in comparison to non-movers among young adult migrants, the age group most commonly perceived to be 'healthy migrants'.

Adjusted analyses in this study indicated that the health status of movers result, in part, from socio-demographic selection. Among 18-29 year olds, adjusting for socio-demographic variables increased the odds of poor general and mental health among movers to more socio-economically deprived environments. This pattern reflected the high socio-economic status of some young adults moving towards socio-economically deprived neighbourhoods, including students (Bailey, 2012). In contrast, the marked reduction in odds of poor general and mental health among movers within MEDIx categories and Carstairs quintiles at most ages following adjustment for socio-demographic variables reflects the low socio-economic status of movers over short distances (Bailey & Livingston, 2005; Champion, 2005).

The BHPS, in common with other longitudinal surveys, has disproportionate attrition due to non-response among more mobile people (Buck, 2000). It is likely that the relatively poor health found among young adults in this analysis results, in part, from the survey's disproportionate loss of healthy, high socio-economic status people moving over long distances for education and employment. In contrast, poor health among older movers may have been underestimated as the BHPS will have excluded many respondents in declining health that that become too unwell to participate, or those that died shortly after moving (Contoyannis, Jones, & Rice, 2004; Taylor, et al., 2010).

A further reason why this study of mobility may have identified poorer health among movers than indicated in some previous analyses of broad measures of morbidity and

mortality is that it assessed mental health. The risk of poor mental health among movers, compared to stayers, was found to be elevated to a greater extent than that for poor general health. When considering the whole population, and in most age groups, odds of mental health problems also remained elevated after adjustment for socio-demographic variables. Mental health in the short term may be more sensitive than general health to changes in life circumstances that could both prompt residential mobility and harm health. Research considering life satisfaction and mobility using the BHPS has found that 'subjective wellbeing' declined in the years prior to a residential move, reflecting low levels of satisfaction with housing (Findlay & Nowok, 2012; Nowok, et al., 2013). It is thus possible that dissatisfaction with a place of residence, which prompt some moves, may contribute to the poor mental health of migrants. However, only 7.7% of the sample in this study reported mental health problems. Such a low prevalence suggests that, as noted in the methods section, this measure is more likely to capture mental illness than low levels of psychological wellbeing. These findings for mental health problems also appear consistent with previous UK research assessing people with severe mental illness that has identified high rates of residential mobility (Tulloch, et al., 2011; Tulloch, et al., 2010).

The short time period over which the study analysed residential mobility may have contributed to the high rates of poor health found among movers. By defining mobility as one or more moves over a one-year time period, the study will have included a greater proportion of frequent movers, who are known to be disadvantaged and at risk of poor health, than analysis of a longer time period (Cole, et al., 2006).

Differences between the health of movers to deprived socio-economic and physical environments

In all age groups, the strongest association between mental health and move type was found for movers to more socio-economically deprived areas. This pattern was weakly

echoed for the general health of movers. These results are consistent with previous analysis in the UK and other European countries that has found elevated rates of morbidity and mortality among movers to more socio-economically deprived areas (Connolly & O'Reilly, 2007; Martikainen, et al., 2008; Norman, et al., 2005; Tunstall, et al., 2012; van Lenthe, et al., 2007). The finding that poor mental health was more elevated among movers to socio-economically deprived areas than poor general health among adults in all age groups was also consistent with results from previous UK and Canadian research that has indicated a similar pattern among mothers of young children and adults aged under 55 years (Curtis, et al., 2009; Tunstall, et al., 2012).

The strong association between mover health and socio-economic deprivation supports the interpretation that the relationship between mover health status and area deprivation is influenced by social selection processes. For some movers negative life events, such as relationship breakdown and job loss, may harm health and trigger both individual downward social mobility and spatial mobility to more socio-economically disadvantaged areas (Rabe & Taylor, 2010; Tunstall, et al., 2010). These social processes are unlikely to be fully captured by the use of simple socio-demographic 'control' variables.

A novel finding was the apparently different relationship between health and move type identified for socio-economic and physical environmental deprivation. While, in the analysis of the whole sample, moves to a more socio-economically deprived category held the strongest association with both poor general and mental health, moves to a *less* deprived physical environment held the strongest association with poor mental health.

The poor health of some movers to less deprived physical environments could be explained in part by regional differences in health and physical environment in the UK. The most deprived MEDIx categories are concentrated in Scotland and the North of England because the index contains indicators of cold temperature and ultraviolet B radiation (Pearce,

et al., 2010). The poor health of some movers to less deprived physical environments could therefore reflect moves from regions in Scotland and northern England, the areas in the UK with the poorest health, towards less deprived MEDIx categories in the South (Doran, Drever, & Whitehead, 2004; F Popham, 2005; Frank Popham, Boyle, & Norman, 2010; Wallace & Kulu, 2013; Whynes, 2009). However, most moves in the UK are over short distances and within regions (Champion, 2005).

Previous analysis of rural-urban migration in the UK has found lower mortality rates among people of working age moving into urban areas than among long term urban residents (Riva, Curtis, & Norman, 2011). This suggests that some moves to poor urban physical environments could be associated with good health. Conversely, within some cities in the UK, gentrification and the growing suburbanisation of poverty (Fenton, 2012) could mean that moves away from inner urban neighbourhoods to better physical environments are increasingly associated with personal disadvantage.

This study's findings for mental health appear to contrast with those from previous American analysis of socially selective migration and environmental hazards, such as waste storage and disposal facilities, which have suggested that residential mobility concentrates disadvantaged groups close to hazards (Banzhaf & Walsh, 2008; Crowder & Downey, 2010; Depro, et al., 2012; Gawande, et al., 2000). The relationships between migration and physical environment deprivation may however vary with the type of physical environment disadvantage scale and national context of analysis.

Environmental justice research has commonly focussed upon environmental hazards, such as hazardous waste facilities, that represent clear dis-amenities and so may prompt 'environmentally motivated' migration from the neighbourhood and changes within local housing markets (Depro, et al., 2012). MEDIx however contains a range of different types of indicators of physical deprivation. This is both a strength and a weakness as its component

indicators are likely to be related to health and migration in different ways. Environmental hazards that cannot be immediately detectable, for example, some types of air pollution, may be less likely to prompt migration. Other aspects of poor physical environments in urban areas may be understood by residents as the price that is paid for superior economic and cultural opportunities (McLeod et al., 2000). Another MEDIx indicator, cold temperature, does not vary significantly between neighbourhoods in the same region so is unlikely to prompt short distance moves. The complexity of the geography of multiple environment deprivation means that findings from this study may not be generalizable to other indicators of the physical environment or to other areal scales or countries.

The relationships found between health and physical environment in this study also varied between the age groups and health outcomes analysed. While the greater risk of poor mental health among movers to less physical environmentally deprived areas was notable the same pattern was not found for general health. Some differences in findings for the two health outcomes could be explained by variations between the location of health and residential services for physical and mental health problems. The strongest relationship between general health and MEDIx was found in the 70+ age group, amongst whom movers to more deprived physical environments had the poorest health. This association could reflect the movement of older people with declining physical health towards care homes, and younger family members in more urban areas. Finally, this analysis also emphasizes that, in the short term, most people in the UK are residentially stable and that when they do move they often relocate to neighbourhoods with similar levels of socio-economic and physical environment disadvantage.

Methodological limitations

The study had limitations. Firstly, statistical power was low because of the small numbers of movers in the data. The wards of residence used in the analysis will have

concealed small-scale variations in deprivation and changes in environmental conditions resulting from moves over short distances. The definition of mobility to more or less deprived environments combined moves with small and large changes in deprivation. Health and socio-demographic characteristics were captured only at the survey wave preceding the move so the analysis could not assess how these variables changed before, during and after mobility. The poor health found among most mover groups in adjusted analysis will reflect, in part, residual confounding by socio-demographic factors. Area deprivation was also considered at one time period only. However, the impacts of migration upon population composition may change the socio-economic deprivation of neighbourhoods over time, as this analysis indicates (Paul Norman, 2010). In addition, some aspects of the neighbourhood physical environment, such as air pollution, may alter significantly over short time periods.

Although BHPS data have been widely used to analyse mobility and health (Evandrou, et al., 2010; Nowok, et al., 2013; Rabe & Taylor, 2010) they have some limitations for this purpose. The survey's 'following rules' exclude those moving outside of the UK and most moves by temporary survey members leaving the residence of an original survey member. The rate of self-reported mental health problems found in our analysis is relatively low in comparison to prevalence of common mental disorders and lifetime incidence of bipolar disorder, schizophrenia and personality disorders indicated in data from the Adult Psychiatric Morbidity Survey in England (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009), which may reflect under-reporting.

This analysis used cross-sectional weights for the wave proceeding moves but included only survey members that also responded at the following wave. These weights therefore will not have compensated for bias due to attrition between the waves. Cases in Northern Ireland were underrepresented in the analysis relative to the rest of the UK as respondents from this country were only included in the sample during 2001-2006.

Conclusion

This study indicated that young and old movers within the UK may be at risk of poor health. It showed that mental health problems are elevated among movers to more socio-economically deprived areas. Residential mobility may therefore contribute to the processes through which health and socio-economic disadvantage are reinforced and accumulate across the life course. The implication of these patterns of migration for health may be particularly pertinent to European countries experiencing new patterns of migration related to high unemployment and austerity policies. This includes the UK where the introduction of changes to social housing benefits, capping receipt of benefits and limiting spare rooms (the 'bedroom tax'), may exacerbate health and socio-economically selective patterns of migration (Pearce, 2013). Conversely, the study is also the first to demonstrate mental health problems are elevated among people moving to better physical environments. Further analysis exploring the reasons people move may support understanding of why people in the UK with poor mental health are moving towards more socio-economically deprived areas and away from poor physical environments.

Tables

Table 1. Percentages of movers by type and age group.

Mover group				Age group in years						
				Total	18-29	30-39	40-49	50-59	60-69	70+
Total			N[a]	122,570	23,135	25,425	22,678	20,117	14,623	16,592
			%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Stayer	Total		%	91.5	76.7	89.4	94.5	95.6	96.8	96.9
Mover	Total		%	8.5	23.3	10.6	5.5	4.4	3.2	3.1
	Carstairs	Moved within quintile	%	3.9	10.0	4.8	2.8	2.1	1.5	1.5
		Moved to more deprived quintile	%	2.2	6.8	2.4	1.3	1.1	0.8	0.8
		Moved to less deprived quintile	%	2.4	6.5	3.4	1.4	1.2	0.9	0.8
	MEDIx	Moved within category	%	5.5	14.9	7.0	3.8	2.7	2.0	1.9
		Moved to more deprived category	%	1.4	4.4	1.5	0.7	0.7	0.5	0.6
		Moved to less deprived category	%	1.6	4.0	2.0	1.0	0.9	0.7	0.6

[a] Total observations.

Table 2. Percentages of general health status by mover type and age group.

General health status at Time 1										
Age group in years and general health status at Time 1	Total		Stayer Total	Mover Total	Carstairs			MEDIx		
					Moved within quintile	Moved to more deprived quintile	Moved to less deprived quintile	Moved within category	Moved to more deprived category	Moved to less deprived category
	N^a	%	%	%	%	%	%	%	%	%
Total										
Good	85,683	70.1	69.8	73.0	71.1	73.2	75.8	72.4	74.0	74.2
Poor	36,887	29.9	30.2	27.0	28.9	26.8	24.2	27.6	26.0	25.8
				<0.001[b]			<0.01[c]			N.S.[de]
18-29										
Good	18,202	79.0	79.5	77.6	77.1	77.5	78.5	77.6	78.1	77.3
Poor	4,933	21.0	20.5	22.4	22.9	22.5	21.5	22.4	21.9	22.7
				<0.05[b]			N.S.[ce]			N.S.[de]
30-39										
Good	19,346	76.9	76.8	77.9	76.5	76.1	81.2	78.3	75.6	78.3
Poor	6,079	23.1	23.2	22.1	23.5	23.9	18.8	21.7	24.4	21.7
				N.S.[be]			N.S.[ce]			N.S.[de]
40-49										
Good	16,495	73.5	73.7	70.4	68.1	70.3	74.9	69.1	74.6	72.0
Poor	6,183	26.5	26.3	29.6	31.9	29.7	25.1	30.9	25.4	28.0
				N.S.[be]			N.S.[ce]			N.S.[de]
50-59										
Good	13,436	68.7	68.8	66.5	60.8	72.5	71.2	62.8	79.2	67.3
Poor	6,681	31.3	31.2	33.5	39.2	27.5	28.8	37.2	20.8	32.7
				N.S.[be]			<0.05[c]			<0.05[d]
60-69										
Good	9,161	64.2	64.3	60.9	56.2	67.9	62.4	55.7	60.5	75.4
Poor	5,462	35.8	35.7	39.1	43.8	32.1	37.6	44.3	39.5	24.6
				N.S.[be]			N.S.[ce]			<0.05[d]
70+										
Good	9,043	55.3	55.7	42.9	43.7	35.3	48.6	42.3	37.8	49.9
Poor	7,549	44.7	44.3	57.1	56.3	64.7	51.4	57.7	62.2	50.1
				<0.001[b]			N.S.[ce]			N.S.[de]

[a] Total observations.

[b] P-value Pearson Chi-square comparison of stayers and movers.

[c] P-value Pearson Chi-square comparison of Carstairs mover types.

[d] P-value Pearson Chi-square comparison of MEDIx mover types.

[e] Not significant.

Table 3. Percentages mental health problems by mover type and age group.

Mental health problems at Time 1										
Age group in years and mental health problems at Time 1	Total		Stayer Total	Mover Total	Carstairs			MEDIx		
					Moved within quintile	Moved to more deprived quintile	Moved to less deprived quintile	Moved within category	Moved to more deprived category	Moved to less deprived category
	N[a]	%	%	%	%	%	%	%	%	%
Total										
No	112,461	92.3	92.4	91.5	91.3	90.8	92.7	91.6	92.1	91.0
Yes	10,109	7.7	7.6	8.5	8.7	9.2	7.3	8.4	7.9	9.0
				<0.05[b]			N.S.[ce]			N.S.[de]
18-29										
No	21,854	94.8	95.0	93.9	93.9	94.0	93.8	94.0	94.3	93.1
Yes	1,281	5.2	5.0	6.1	6.1	6.0	6.2	6.0	5.7	6.9
				<0.05[b]			N.S.[ce]			N.S.[de]
30-39										
No	23,409	92.9	93.0	92.6	91.3	91.9	94.9	92.4	92.4	93.3
Yes	2,016	7.1	7.0	7.4	8.7	8.1	5.1	7.6	7.6	6.7
				N.S.[be]			N.S.[ce]			N.S.[de]
40-49										
No	20,564	91.5	91.7	87.4	88.2	82.2	90.7	86.9	88.5	88.5
Yes	2,114	8.5	8.3	12.6	11.8	17.8	9.3	13.1	11.5	11.5
				<0.001[b]			<0.05[c]			N.S.[de]
50-59										
No	17,935	90.5	90.7	85.8	85.9	85.6	85.8	86.4	87.3	82.8
Yes	2,182	9.5	9.3	14.2	14.1	14.4	14.2	13.6	12.7	17.2
				<0.001[b]			N.S.[ce]			N.S.[de]
60-69										
No	13,438	92.7	92.8	89.7	89.7	89.2	90.2	88.5	90.3	92.3
Yes	1,185	7.3	7.2	10.3	10.3	10.8	9.8	11.5	9.7	7.7
				<0.05[b]			N.S.[ce]			N.S.[de]
70+										
No	15,261	91.9	92.0	87.6	88.7	83.0	89.7	89.2	86.3	83.4
Yes	1,331	8.1	8.0	12.4	11.3	17.0	10.3	10.8	13.7	16.6
				<0.01[b]			N.S.[ce]			N.S.[de]

[a] Total observations.

[b] P-value Pearson Chi-square comparison of stayers and movers.

[c] P-value Pearson Chi-square comparison of Carstairs mover types.

[d] P-value Pearson Chi-square comparison of MEDIx mover types.

[e] Not significant.

Table 4. Odds ratios of poor general and mental health problems comparing movers and stayers by age group.

Age group in years and mover status	General health status at Time 1 (poor)		Mental health problems at Time 1 (yes)	
	Unadjusted	Adjusted[a]	Unadjusted	Adjusted[a]
Total				
Stayer	1	1	1	1
Mover	0.86 (0.80-0.92)	1.09 (1.02-1.17)	1.13 (1.02-1.24)	1.25 (1.13-1.38)
18-29				
Stayer	1	1	1	1
Mover	1.12 (1.01-1.24)	1.11 (1.01-1.23)	1.24 (1.04-1.47)	1.21 (1.02-1.44)
30-39				
Stayer	1	1	1	1
Mover	0.94 (0.83-1.06)	0.93 (0.82-1.05)	1.06 (0.85-1.30)	1.04 (0.85-1.27)
40-49				
Stayer	1	1	1	1
Mover	1.18 (1.00-1.40)	1.09 (0.92-1.30)	1.60 (1.26-2.03)	1.34 (1.04-1.72)
50-59				
Stayer	1	1	1	1
Mover	1.11 (0.89-1.40)	1.04 (0.83-1.30)	1.62 (1.26-2.08)	1.45 (1.12-1.87)
60-69				
Stayer	1	1	1	1
Mover	1.16 (0.86-1.55)	1.11 (0.83-1.49)	1.48 (1.04-2.11)	1.52 (1.05-2.22)
70+				
Stayer	1	1	1	1
Mover	1.67 (1.32-2.12)	1.69 (1.32-2.16)	1.63 (1.17-2.28)	1.57 (1.12-2.21)

[a] Adjusted for age group, sex, marital status, household type, tenure, education and social class.

Table 5. Odds ratios for poor general health status comparing mover types by age group.

General health status at Time 1 (poor)				
Age group in years and mover type	Carstairs		MEDIx	
	Unadjusted	Adjusted[a]	Unadjusted	Adjusted[a]
Total				
Stayer	1	1	1	1
Moved within quintile/category	0.94 (0.85-1.03)	1.12 (1.02-1.23)	0.88 (0.81-0.96)	1.10 (1.01-1.20)
Moved to more deprived quint./cat.	0.85 (0.75-0.95)	1.18 (1.05-1.32)	0.81 (0.71-0.93)	1.10 (0.97-1.25)
Moved to less deprived quint./cat.	0.74 (0.66-0.82)	0.98 (0.87-1.09)	0.81 (0.71-0.92)	1.06 (0.93-1.21)
18-29				
Stayer	1	1	1	1
Moved within quintile/category	1.15 (1.00-1.32)	1.08 (0.94-1.24)	1.12 (0.99-1.27)	1.09 (0.96-1.23)
Moved to more deprived quint./cat.	1.12 (0.96-1.32)	1.20 (1.02-1.41)	1.09 (0.89-1.32)	1.16 (0.95-1.42)
Moved to less deprived quint./cat.	1.06 (0.89-1.27)	1.07 (0.90-1.29)	1.14 (0.92-1.40)	1.16 (0.94-1.43)
30-39				
Stayer	1	1	1	1
Moved within quintile/category	1.02 (0.85-1.21)	0.96 (0.80-1.16)	0.92 (0.79-1.07)	0.90 (0.77-1.05)
Moved to more deprived quint./cat.	1.04 (0.82-1.32)	1.05 (0.83-1.32)	1.06 (0.79-1.43)	1.08 (0.80-1.45)
Moved to less deprived quint./cat.	0.76 (0.61-0.95)	0.80 (0.65-1.00)	0.92 (0.70-1.20)	0.94 (0.72-1.23)
40-49				
Stayer	1	1	1	1
Moved within quintile/category	1.32 (1.06-1.64)	1.17 (0.94-1.46)	1.25 (1.03-1.52)	1.11 (0.91-1.35)
Moved to more deprived quint./cat.	1.19 (0.84-1.67)	1.14 (0.80-1.62)	0.96 (0.63-1.45)	0.97 (0.64-1.48)
Moved to less deprived quint./cat.	0.94 (0.72-1.23)	0.90 (0.69-1.19)	1.09 (0.76-1.56)	1.12 (0.77-1.62)
50-59				
Stayer	1	1	1	1
Moved within quintile/category	1.42 (1.07-1.89)	1.25 (0.94-1.66)	1.31 (1.00-1.70)	1.20 (0.92-1.56)
Moved to more deprived quint./cat.	0.84 (0.59-1.20)	0.87 (0.62-1.22)	0.58 (0.36-0.94)	0.53 (0.34-0.84)
Moved to less deprived quint./cat.	0.89 (0.62-1.29)	0.85 (0.58-1.25)	1.07 (0.68-1.70)	1.07 (0.68-1.68)
60-69				
Stayer	1	1	1	1
Moved within quintile/category	1.41 (0.97-2.03)	1.28 (0.88-1.87)	1.43 (1.01-2.03)	1.30 (0.92-1.83)
Moved to more deprived quint./cat.	0.85 (0.48-1.51)	0.85 (0.48-1.50)	1.18 (0.65-2.13)	1.25 (0.69-2.29)
Moved to less deprived quint./cat.	1.09 (0.64-1.86)	1.11 (0.64-1.93)	0.59 (0.32-1.08)	0.63 (0.32-1.24)
70+				
Stayer	1	1	1	1
Moved within quintile/category	1.62 (1.16-2.25)	1.55 (1.11-2.17)	1.72 (1.27-2.31)	1.72 (1.27-2.35)
Moved to more deprived quint./cat.	2.31 (1.45-3.67)	2.70 (1.67-4.38)	2.06 (1.26-3.39)	2.05 (1.25-3.37)
Moved to less deprived quint./cat.	1.33 (0.85-2.08)	1.30 (0.81-2.07)	1.26 (0.72-2.21)	1.31 (0.73-2.36)

[a] Adjusted for age group, sex, marital status, household type, tenure, education and social class.

Table 6. Odds ratios for mental health problems comparing mover types by age group.

Mental health problems at Time 1 (yes)				
Age group in years and mover type	Carstairs		MEDIx	
	Unadjusted	Adjusted[a]	Unadjusted	Adjusted[a]
Total				
Stayer	1	1	1	1
Moved within quintile/category	1.17 (1.01-1.35)	1.21 (1.05-1.39)	1.12 (0.98-1.28)	1.21 (1.06-1.37)
Moved to more deprived quint./cat.	1.24 (1.04-1.49)	1.54 (1.27-1.86)	1.05 (0.85-1.30)	1.27 (1.03-1.57)
Moved to less deprived quint./cat.	0.96 (0.83-1.11)	1.10 (0.94-1.28)	1.21 (1.01-1.45)	1.40 (1.16-1.70)
18-29				
Stayer	1	1	1	1
Moved within quintile/category	1.24 (0.96-1.59)	1.10 (0.86-1.41)	1.21 (0.99-1.49)	1.14 (0.92-1.40)
Moved to more deprived quint./cat.	1.22 (0.90-1.64)	1.38 (1.02-1.88)	1.16 (0.83-1.62)	1.31 (0.93-1.83)
Moved to less deprived quint./cat.	1.26 (0.98-1.61)	1.25 (0.95-1.63)	1.41 (1.01-1.96)	1.42 (1.02-1.97)
30-39				
Stayer	1	1	1	1
Moved within quintile/category	1.25 (0.92-1.69)	1.16 (0.87-1.54)	1.08 (0.84-1.38)	1.03 (0.81-1.32)
Moved to more deprived quint./cat.	1.17 (0.79-1.72)	1.18 (0.80-1.73)	1.09 (0.67-1.76)	1.11 (0.70-1.76)
Moved to less deprived quint./cat.	0.71 (0.50-1.00)	0.74 (0.52-1.06)	0.95 (0.61-1.48)	0.99 (0.63-1.56)
40-49				
Stayer	1	1	1	1
Moved within quintile/category	1.49 (1.06-2.08)	1.17 (0.82-1.67)	1.67 (1.26-2.21)	1.34 (1.00-1.80)
Moved to more deprived quint./cat.	2.40 (1.61-3.58)	2.15 (1.39-3.34)	1.44 (0.77-2.68)	1.23 (0.69-2.20)
Moved to less deprived quint./cat.	1.14 (0.73-1.78)	1.01 (0.63-1.63)	1.44 (0.90-2.32)	1.43 (0.86-2.36)
50-59				
Stayer	1	1	1	1
Moved within quintile/category	1.61 (1.17-2.21)	1.38 (0.99-1.93)	1.53 (1.12-2.11)	1.32 (0.96-1.81)
Moved to more deprived quint./cat.	1.64 (1.00-2.70)	1.63 (0.99-2.68)	1.42 (0.81-2.50)	1.33 (0.74-2.40)
Moved to less deprived quint./cat.	1.61 (1.06-2.45)	1.42 (0.91-2.23)	2.03 (1.29-3.20)	1.99 (1.27-3.14)
60-69				
Stayer	1	1	1	1
Moved within quintile/category	1.48 (0.87-2.52)	1.42 (0.82-2.45)	1.66 (1.04-2.68)	1.70 (1.06-2.72)
Moved to more deprived quint./cat.	1.56 (0.82-2.98)	1.85 (0.93-3.69)	1.38 (0.58-3.27)	1.44 (0.55-3.73)
Moved to less deprived quint./cat.	1.40 (0.71-2.74)	1.44 (0.70-2.95)	1.07 (0.45-2.52)	1.12 (0.45-2.79)
70+				
Stayer	1	1	1	1
Moved within quintile/category	1.46 (0.86-2.47)	1.36 (0.80-2.31)	1.40 (0.92-2.13)	1.37 (0.89-2.09)
Moved to more deprived quint./cat.	2.35 (1.25-4.42)	2.41 (1.26-4.63)	1.83 (0.86-3.91)	1.63 (0.75-3.56)
Moved to less deprived quint./cat.	1.32 (0.66-2.65)	1.28 (0.63-2.57)	2.28 (1.07-4.86)	2.28 (1.04-4.97)

[a] Adjusted for age group, sex, marital status, household type, tenure, education and social class.

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