



# Selection Effects and Health Inequalities

**Departmental Seminar**

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# Context

- Persisting social and spatial inequalities in health: males born in the least deprived areas in 2014-16 expect to live **almost a decade more** than those born in most deprived areas (ONS, 2018)
- Narrows with age, but do not disappear
- Compounded by differences in **healthy life expectancy** and **significant increases** in socioeconomic inequalities in life expectancy at birth

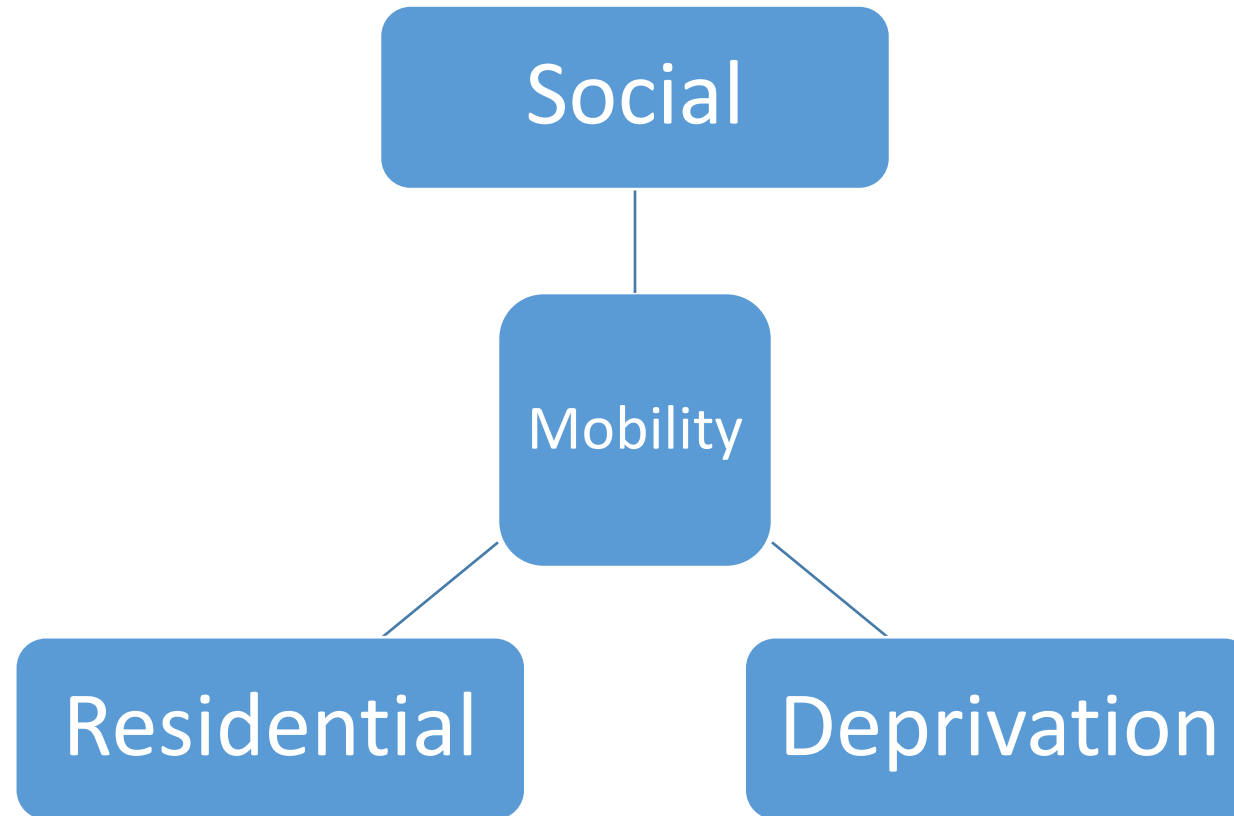
# Explaining *changing* health gradients?

- Multitude of conceptual frameworks explaining why socioeconomic and spatial inequalities in health arise: material, psycho-social, behavioural, lifecourse (REFS)
- But, change over time?
- Over time, *changing* health gradients due to a process of selective sorting between area types and / or social classes

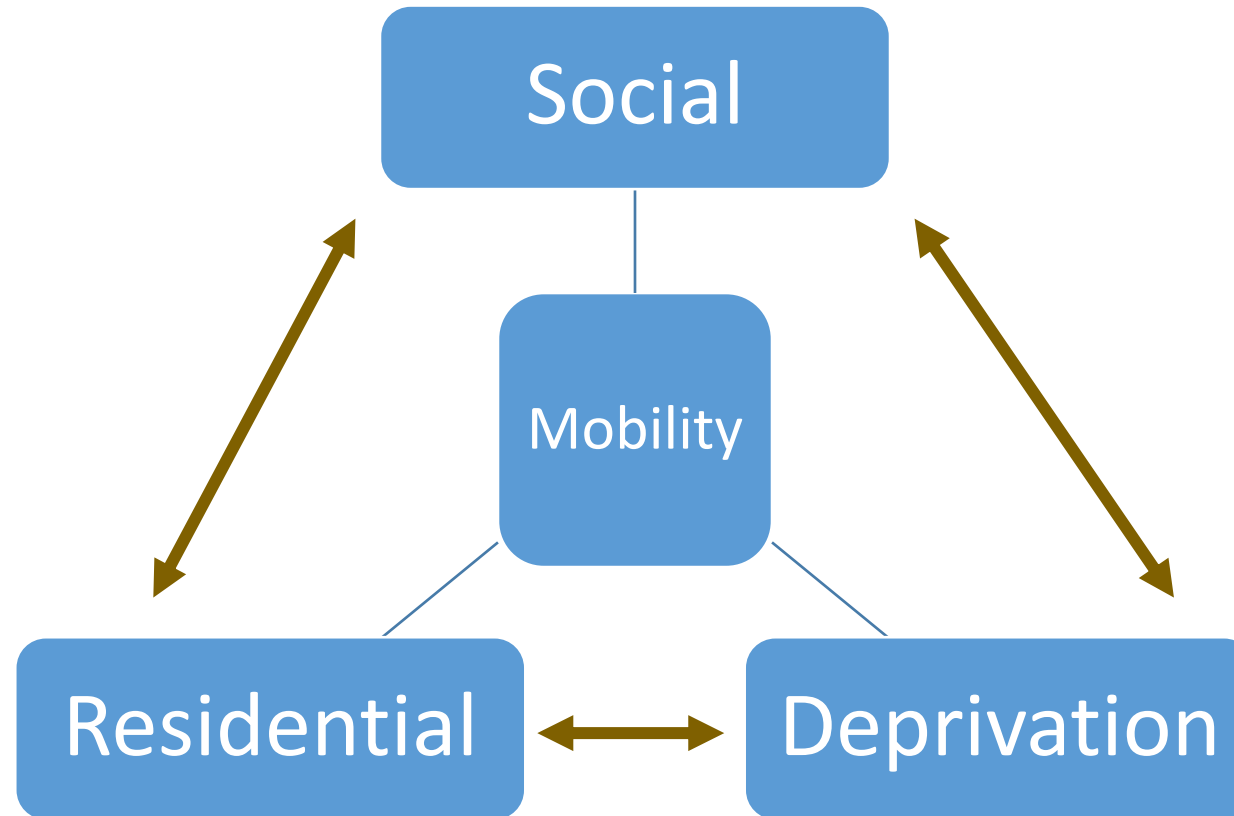


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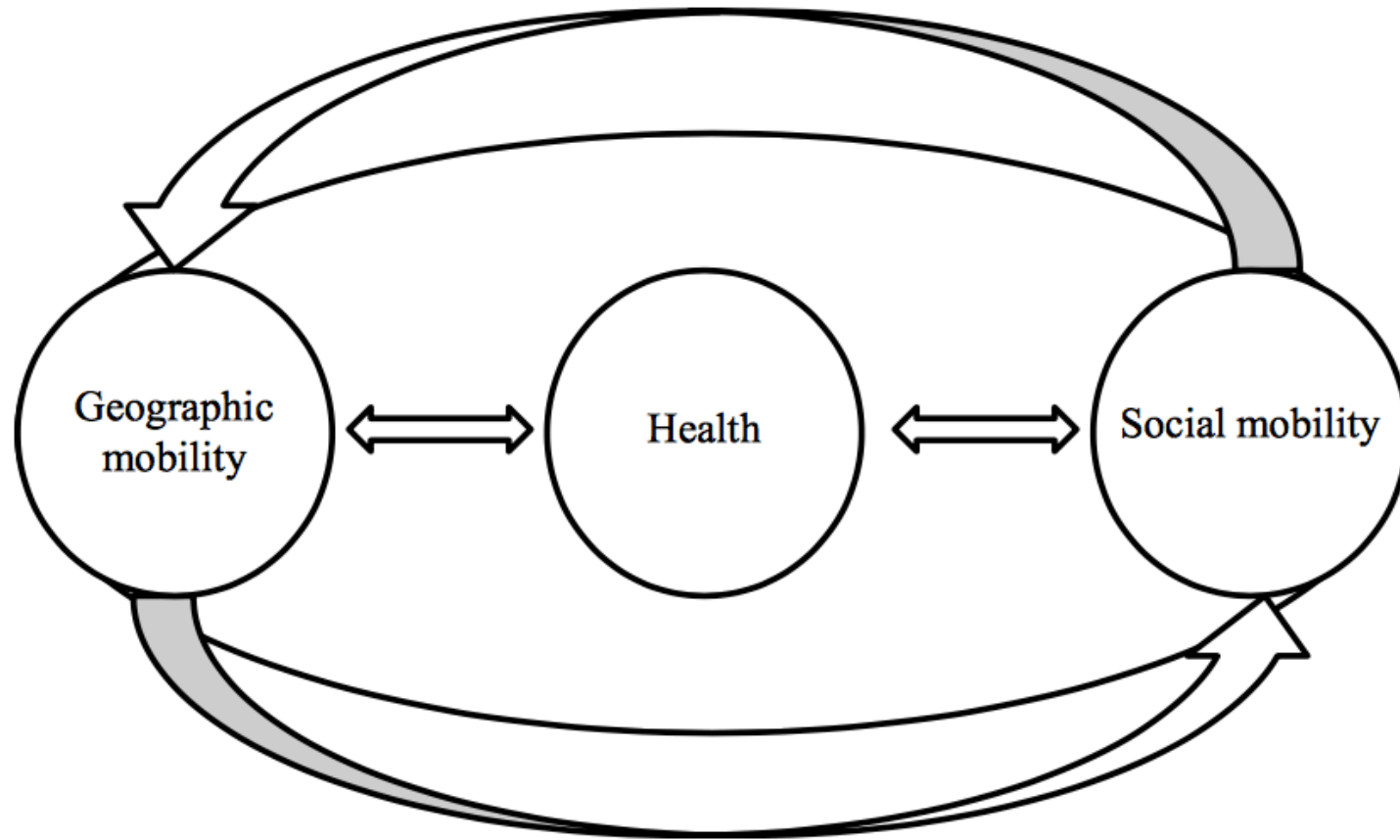
# Socio-demographic selective sorting



# Socio-demographic selective sorting



# Interdependent mobilities and Health



# Competing Frameworks: modelling individual-level outcomes (I)

- Verheij et al. (1998): compare health between mobile groups differentiated in direction of the move (urban / rural); compare health differences between movers and stayers
- Tunstall et al. (2014): compare health differences between a) movers and stayers, and b) movers to more and less deprived areas

# Competing Frameworks: modelling individual-level outcomes (I)

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- Tunstall et al. (2014): compare health differences between a) movers and stayers, and b) moves to more and less deprived areas
- Controlling for socioeconomic variables *explains away* health differences
- Odds of poor health elevated for movers: poor mental health associated with moves towards more socioeconomic deprivation, better physical environment



# Competing Frameworks: modelling individual-level outcomes (II)

- Dijkstra et al. (2015): compare odds of poor health for movers into and out of regions within declining and non-declining populations
- Maheswaran et al. (2018): compare risk of mortality between stayers, and those moving out of differently deprived areas

# Competing Frameworks: modelling individual-level outcomes (II)

- Dijkstra et al. (2015): compare odds of poor health for movers into and out of regions within declining and non-declining populations
- Movers healthier than stayers, effect larger for movers out of declining regions than for movers into declining regions...
- Maheswaran et al. (2018): compare risk of mortality between stayers, and those moving out of differently deprived areas
- Demonstrates central tenet of health selection hypothesis: movers towards deprivation had poorer health than immobile peers, movers away from deprivation have better health

# Competing Frameworks: a counterfactual approach?

- Gartner et al. (2018): compare risk of mortality by deprivation quintile under two scenarios- observed and counterfactual (artificially return individuals to origin deprivation quintile)

# Competing Frameworks: a counterfactual approach?

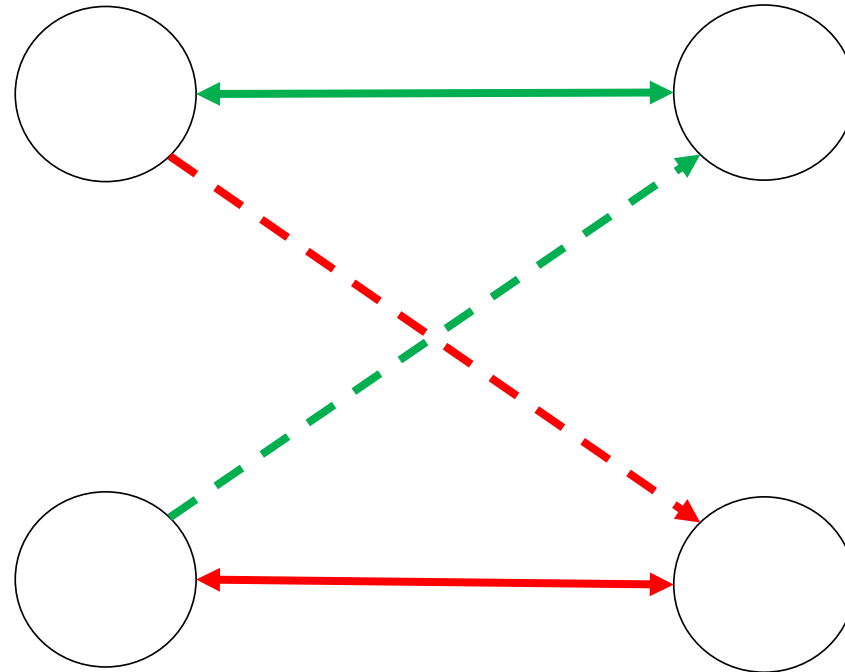
- Gartner et al. (2018): compare risk of mortality by deprivation quintile under two scenarios- observed and counterfactual (artificially return individuals to origin deprivation quintile)
- Strong implication that differences between groups affect area relationships... but not specifically measured

# Competing Frameworks: Putting Populations Back

- Counterfactual approach *at the aggregate-level*
- Lifetime migration at regional level (Brimblecombe et al., 1999; 2000)
- Health-deprivation relationships (Boyle et al., 2004; Norman et al., 2005; Boyle et al., 2009)
- Later life migration and regional old-age mortality (Kibele and Janssen, 2013)
  
- Necessary... but not sufficient!
- Comparisons must be made between the mobile groups (Verheij et al., 1998)

# Selective sorting and health: establishing a framework of analysis (I)

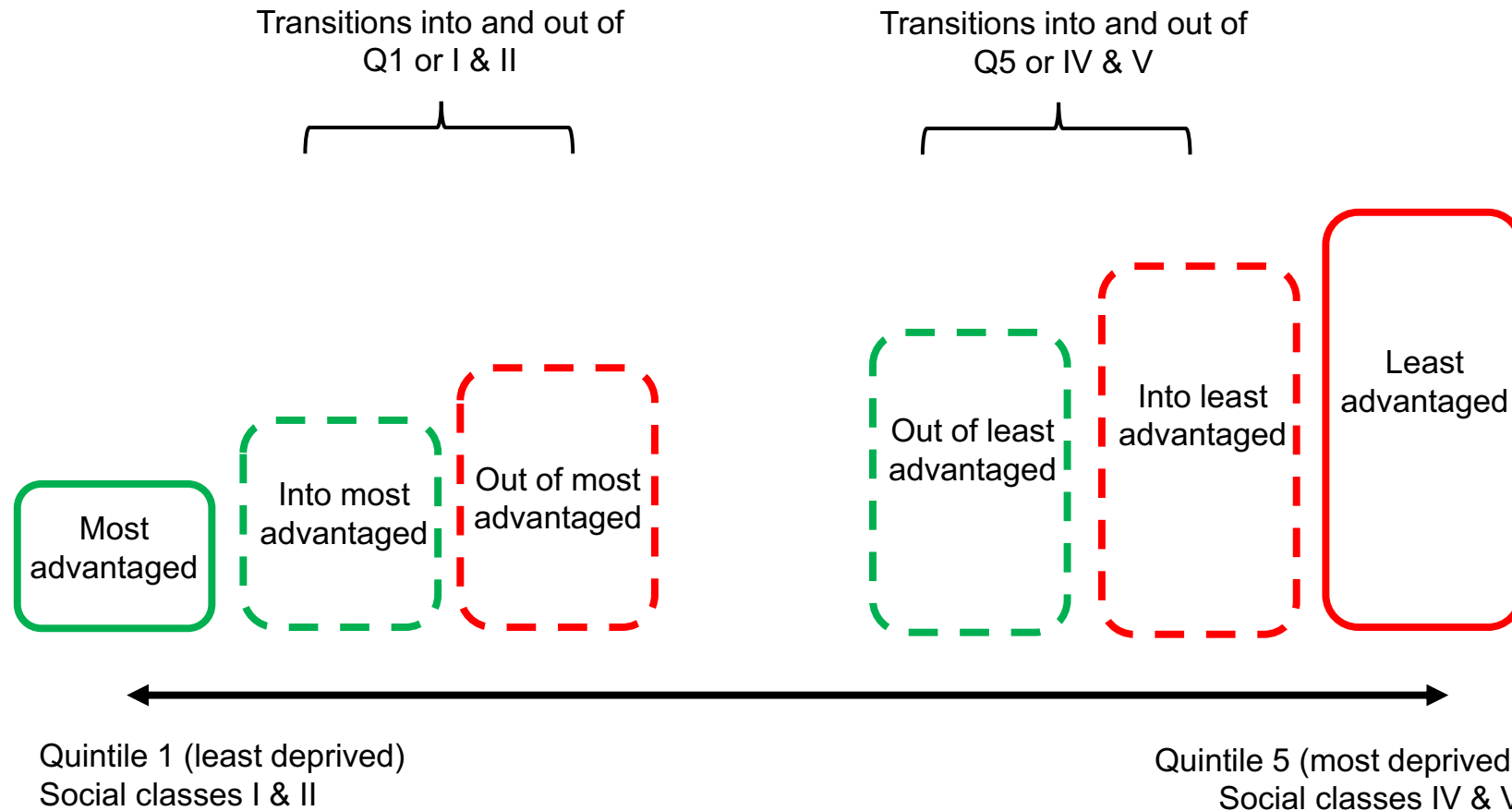
Quintile 1 (least deprived)  
Social classes I & II



- ← Stable good health
- - - Improving health
- Worsening health
- - - Stable poor health

Quintile 5 (most deprived)  
Social classes IV & V

# Selective sorting and health: establishing a framework of analysis (II)

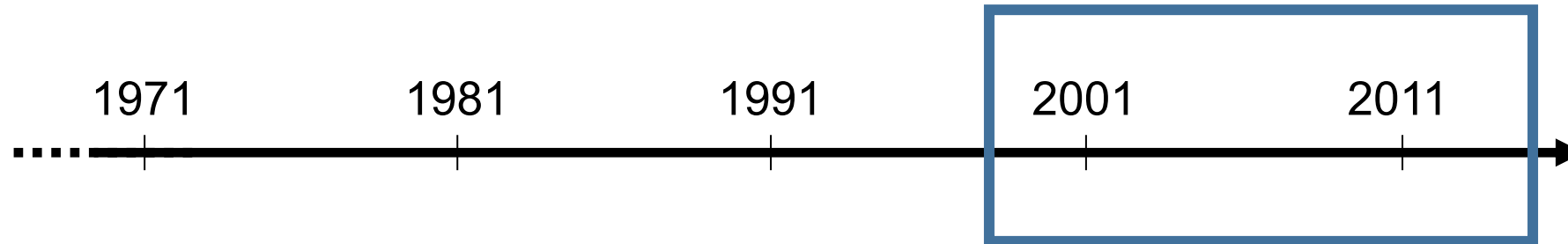


# Selective sorting and health: establishing a framework of analysis (III)

- a) To what extent do health gradients vary when populations are able to move between area types and social classes compared to those arising when populations are *put back* into their area type or social class of origin?
- b) To what extent does the health status of those entering the most and least advantaged areas, or highest and lowest social classes differ from those leaving these areas or classes?
- c) To what extent does the patterning to health by transitions into and out of differently deprived areas or social classes vary by migrant status?



# Data



- Census data: age; sex; ethnicity; marital status; **health status**; social class; educational attainment; **migrant indicators**
- Event data: births; immigration; deaths; emigration
- ~ 1% sample, ~ 500k at each census (cross-sectional) & ~ 350k across the censuses (longitudinal)
- SAMPLE: present at **2001 and 2011**

Variables			2001-2011, count (prop (%))	
Label	Categories	Description	2001	2011
Limiting long-term illness	LLTI	Presence of LLTI at each census	42,875 (13.3%)	
	No LLTI		321,697 (100%)	278,822 (86.7%)
Age	-	10-year age groups		
Social Class	I & II	Registrar General's schema of social class derived from the NS-SeC	81,516 (25.3%)	94,993 (29.5%)
	IIIN		55,823 (17.4%)	71,151 (22.1%)
	IIIM		44,339 (13.8%)	54,232 (16.9%)
	IV & V		40,288 (12.5%)	21,188 (8.8%)
	Unclassifiable		99,731 (31.0%)	73,133 (22.7%)
Social mobility	Stable I & II	Social class transitions (excludes unclassifiable) <sup>†</sup>	56,025 (27.6%)	
	IIIN-IIIM to I & II		19,749 (9.7%)	
	I & II to IIIN-IIIM		20,514 (10.1%)	
	Stable IIIN-IIIN		67,271 (33.1%)	
	IV & V to I-IIIM		18,338 (9.0%)	
	I-IIIM to IV & V		8,400 (4.1%)	
Deprivation	Stable IV & V		12,684 (6.2%)	
	Q1 – Least deprived	Deprivation quintiles based on Carstairs Index score at each census	71,620 (22.3%)	74,418 (23.1%)
	Q2		68,906 (21.4%)	71,949 (22.4%)
	Q3		64,587 (20.1%)	65,882 (20.5%)
	Q4		59,033 (18.4%)	58,869 (18.3%)
Q5 – Most deprived	57,551 (17.9%)		50,579 (15.72%)	
Deprivation mobility	Stable Q1	Deprivation transitions	47,913 (14.9%)	
	Q2-Q4 to Q1		24,259 (7.5%)	
	Q1 to Q2-Q4		22,352 (6.9%)	
	Stable Q2-Q4		154,281 (48.0%)	
	Q5 to Q1-Q4		22,313 (6.9%)	
	Q1-Q4 to Q5		15,341 (4.8%)	
	Stable Q5		35,238 (11.0%)	
Migrant status	Mover	Moved between 2001-2011	132,501 (41.2%)	144,772 (45.0%)
	Stayer		189,196 (58.8%)	176,925 (55.0%)

# Variables

Source: ONS LS

# Methods

Compare gradients: Put  
People Back

(indirectly) Standardised Illness Ratios

SIRs calculated based on health at end of study period by **destination** deprivation quintile / social class **and origin** deprivation quintile / social class

- A) Calculate Q5:Q1 / IV & V: I & II ratio **with movement, and without**
- B) Calculate Slope Index of Inequality (absolute differences) and Relative Index of Inequality (relative differences)

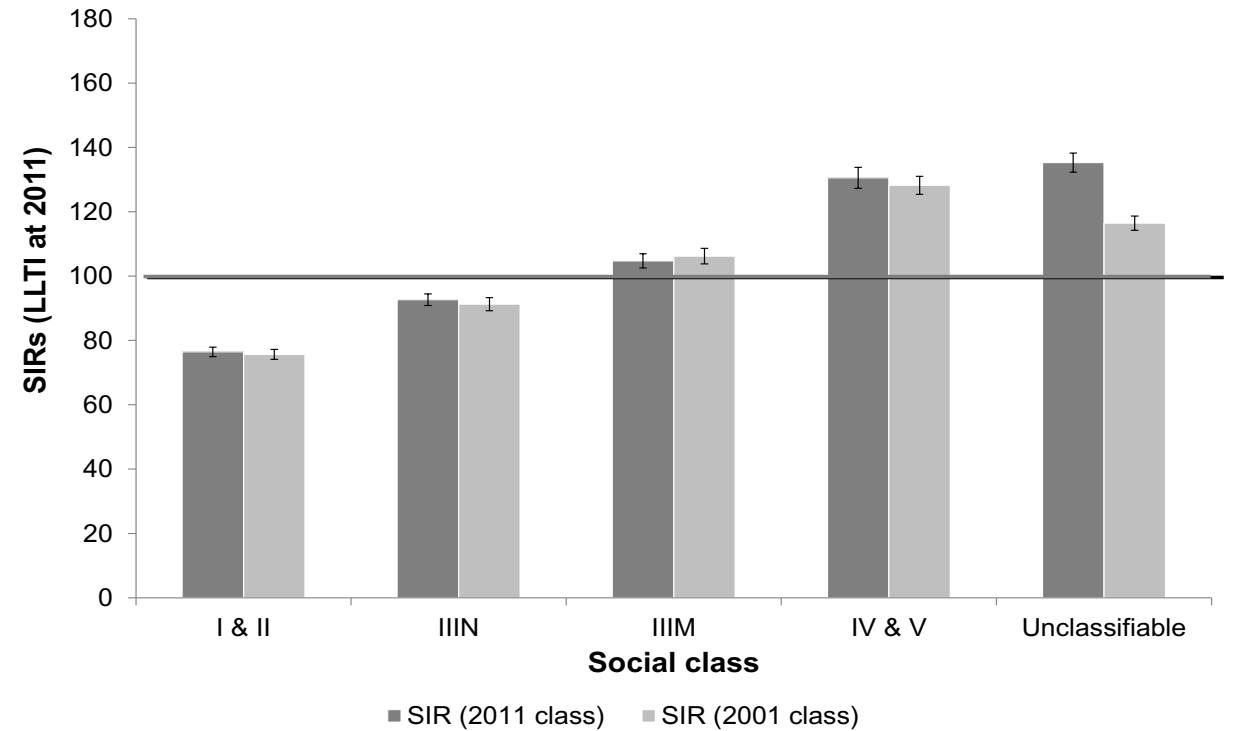
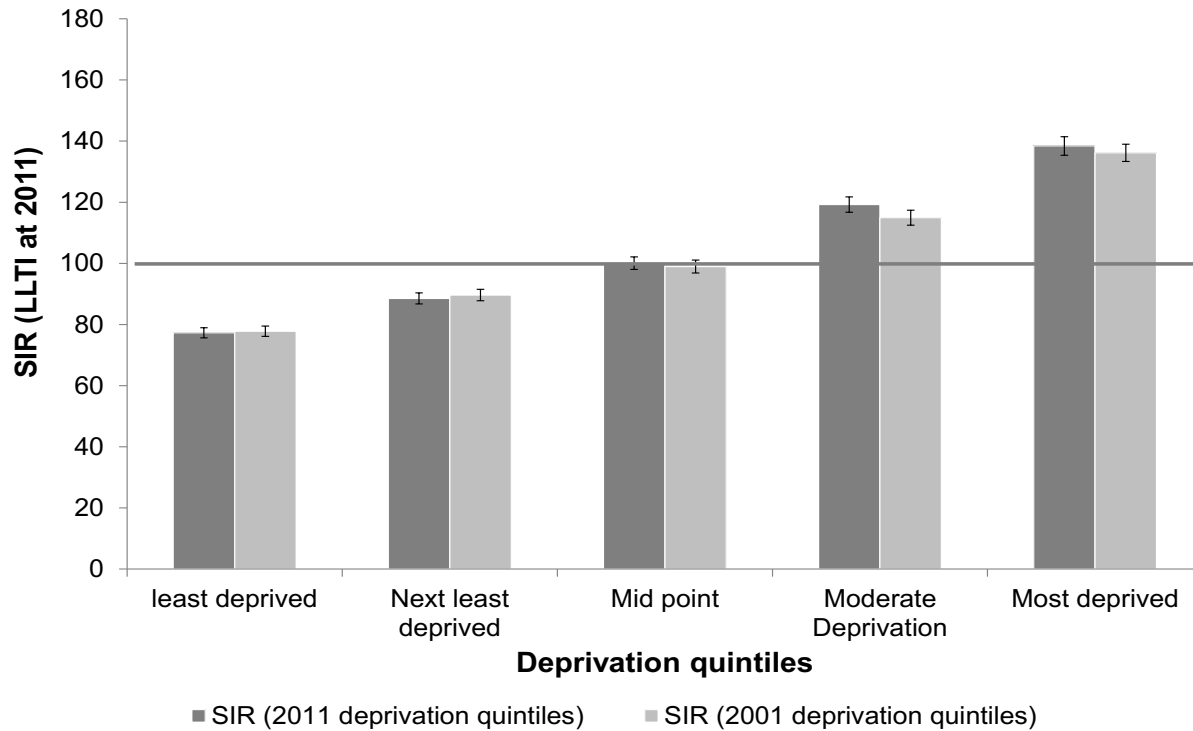
Transitions at the extreme

(indirectly) Standardised Illness Ratios

SIRs for deprivation quintile transitions and social class transitions for

- A) **movers (migrants) and stayers (area type change);**
- B) Movers and Stayers combined: overall influence of selective sorting?

# Results (I): Put People Back



Source: ONS LS

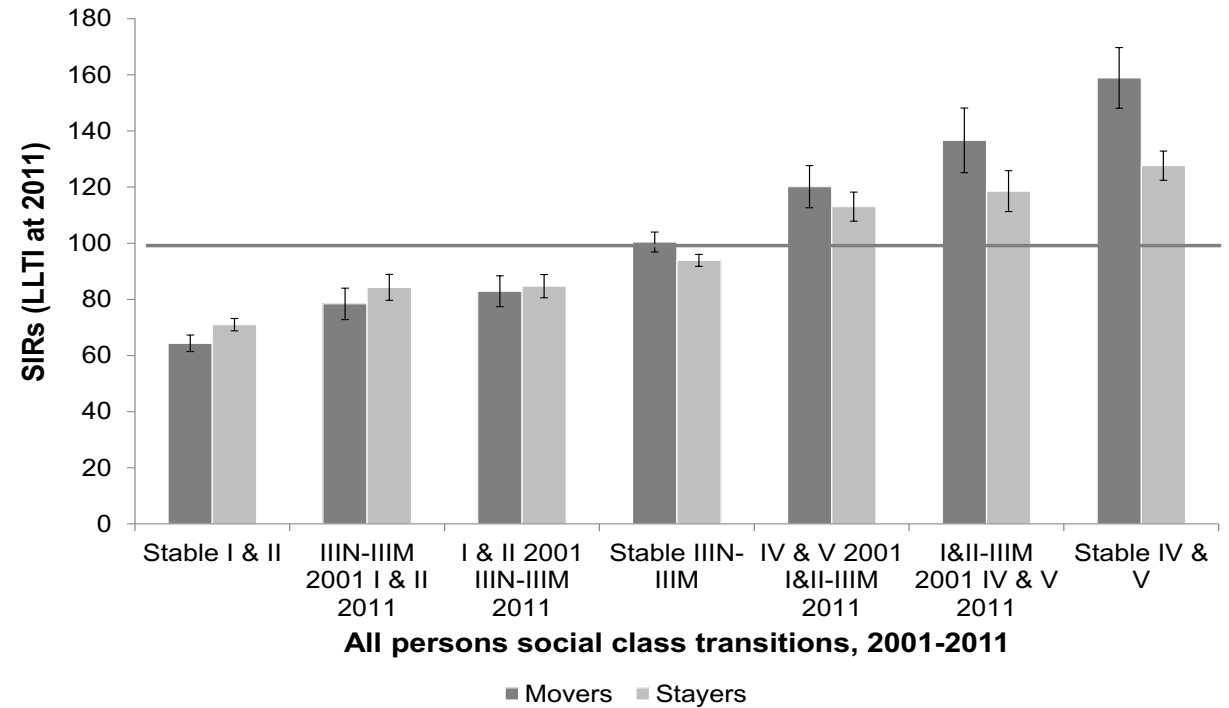
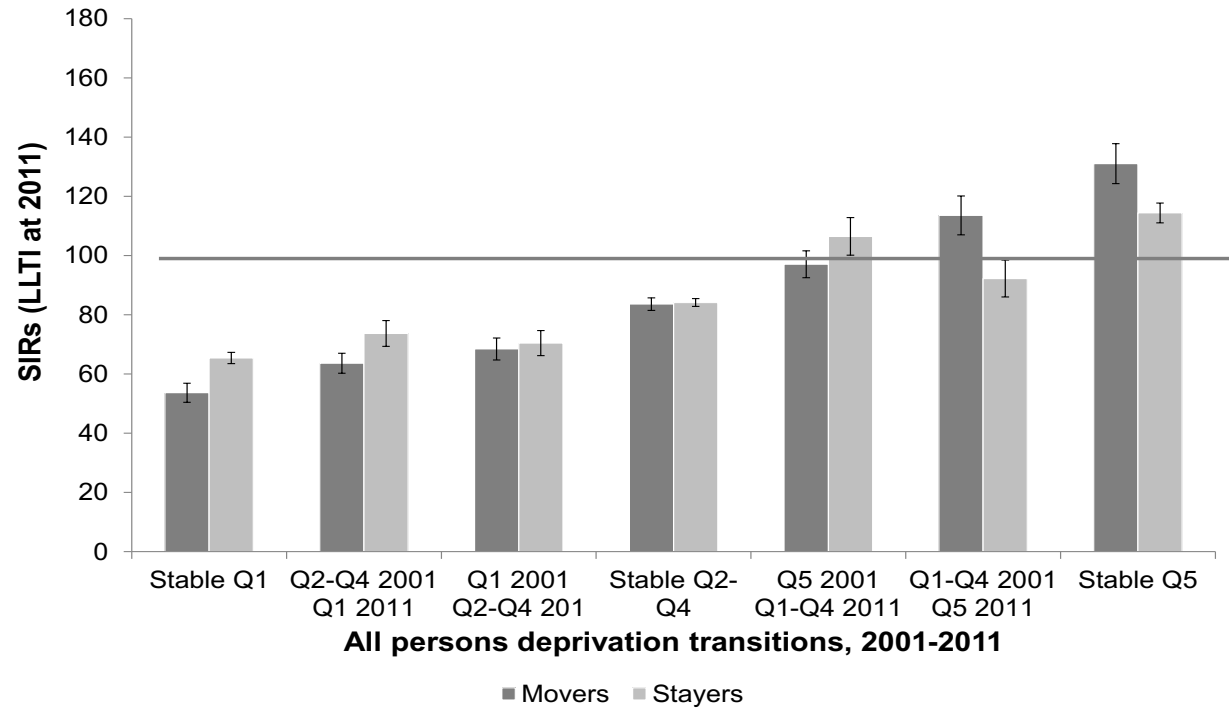
@F\_Darlington

# Results (II): Changing health gradient?

	2001-2011	
	No mobility	Mobility
<b>Extremal Quotients</b>		
Q5:Q1	1.75	1.79
IV & V: I & II	1.54	1.77
Unclassifiable: I & II	1.69	1.71
<b>RII</b>		
Deprivation Quintiles	2.10	2.23
Social Classes		
Excludes Unclassifiable	2.40	2.22
Includes Unclassifiable	1.80	2.48

Source: Authors own calculations, ONS LS

# Results (III): Transitions



Source: ONS LS

# Results (IV): Collective Influence?

Deprivation transition	SIR	Social Class transition	SIR
Stable / churn within Q1	62.8*	Stable I & II	68.77*
Q2-Q4 into Q1	67.8*	IIIN-IIIM into I & II	81.98*
Q1 into Q2-Q4	69.3*	I & II into IIIN-IIIM	84.06*
Stable / churn within Q2-Q4	84.0*	Stable IIIN-IIIM	95.73*
Q5 into Q1-Q4	100.5	IV & V into I-IIIM	115.44*
Q1-Q4 into Q5	103.4	I-IIIM into IV & V	124.30*
Stable / churn within Q5	118.0 *	Stable IV & V	134.58*

Note: \* denotes statistically significant results  
 Source: Authors own calculations, ONS LS

# Discussion (I)

- Establish a framework accounting for interdependent mobility processes and influence on **changing** health gradients
- For mobility to **widen** health gradients:
  - Health gradient **must be steeper** after it is assumed mobility occurred than arises if populations **put back** into place / class of origin
  - Health of the **upwardly mobile** at the extreme must be better than the health of the **downwardly mobile** they replace



# Discussion (II)

- Results suggest selective sorting contributing to widening health inequalities in the population
- Pronounced health (dis)advantage for movers **churning** within most and least deprived areas, or for movers **remaining** in the highest and lowest social classes, demonstrative of the extent to which selective migration can **exaggerate** health gradients
- We do not control for further individual attributes, or account for any accrual of (dis)benefits over time
- Multidimensional nature of selection effects, this framework begins to try and account for some of the relevant interdependencies

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