Do changes in the walkability of the built environment lead to changes in walking behaviour?

A comparison of home movers and stayers in areas undergoing regeneration in Glasgow, UK.

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Street Maps at the Same Scale

Source: Allan B. Jacobs, *Great Streets*, MIT Press, Cambridge, MA, 1993, pp. 221, 225, 249. Reprinted in Reid Ewing, *Pedestrian and Transit-Friendly Design: A Primer for Smart Growth*, Smart Growth Network, August 1999, p. 4. <http://www.epa.gov/dced/pdf/ptfd_primer.pdf>

BE/walkability = walking = health

Need for more causal evidence

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Background

- Problems with existing analyses (Saelens et al, 2003)
  - Self selection bias
  - Not possible to randomly assign individuals to neighbourhoods
- Saelens et al suggest analysing house moves and change in existing neighbourhoods over time
  - Wasfi et al (2016) moving to more walkable neighbourhoods increased utilitarian walking (Canada)
  - Braun et al (2016) No effect of moving to more walkable neighbourhood on walking (but health effects)
- Areas undergoing urban regeneration present this opportunity

GoWell study

15 relatively deprived neighbourhoods in Glasgow, Scotland undergoing programme of regeneration
10 year longitudinal study, surveys in 2006, 2008, 2011 and 2015

- 2011: 4,269 (response rate 45%)
- 2015: 3,833 (response rate 47%)
- 1,063 interviewed in both 2011 and 2015
- 149 (14%) moved house between interviews

GoWell

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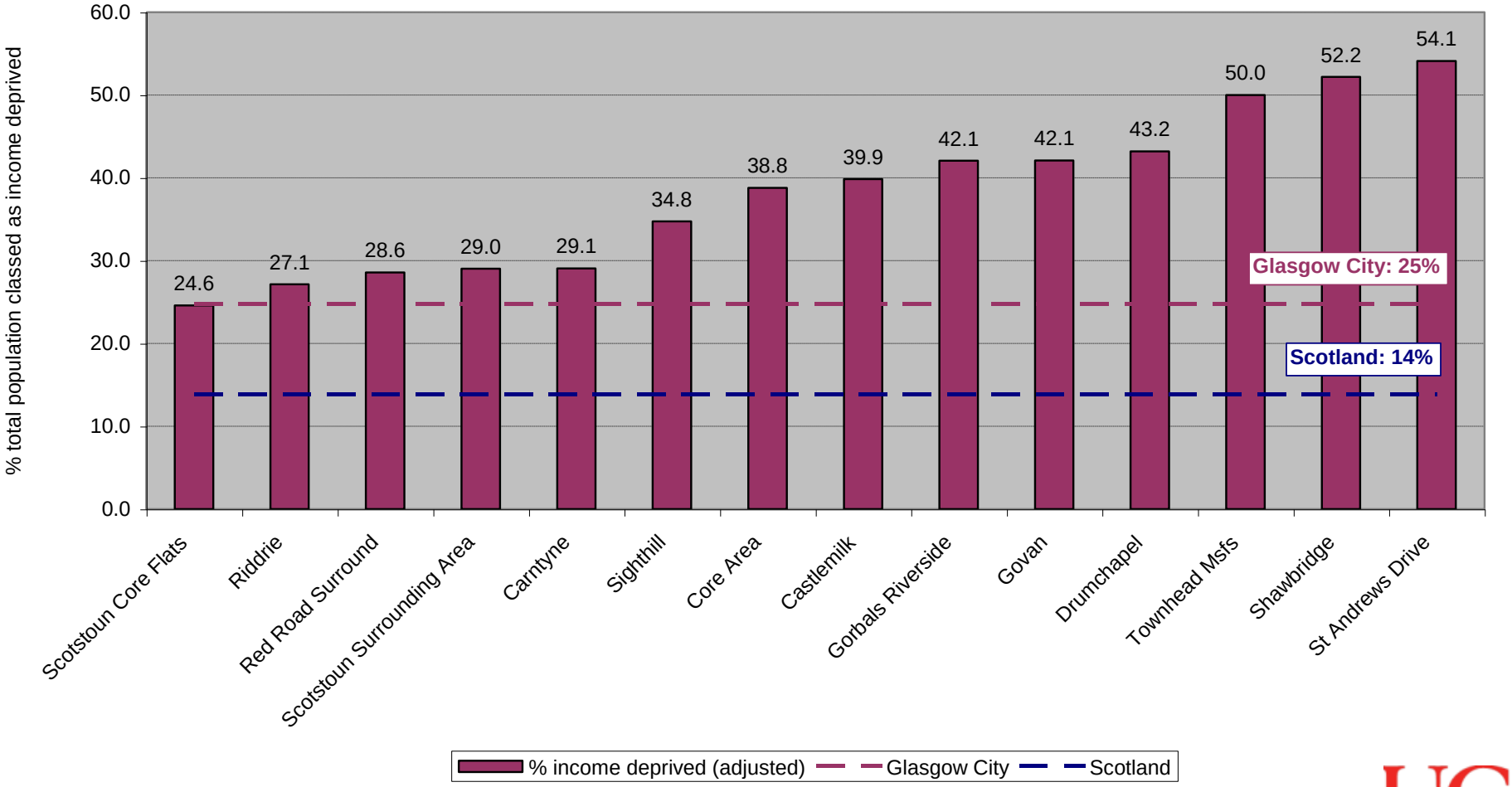
Context: Deprivation, 2005

Income deprivation by Gowell areas
Source: Derived from DWP and SIMD data



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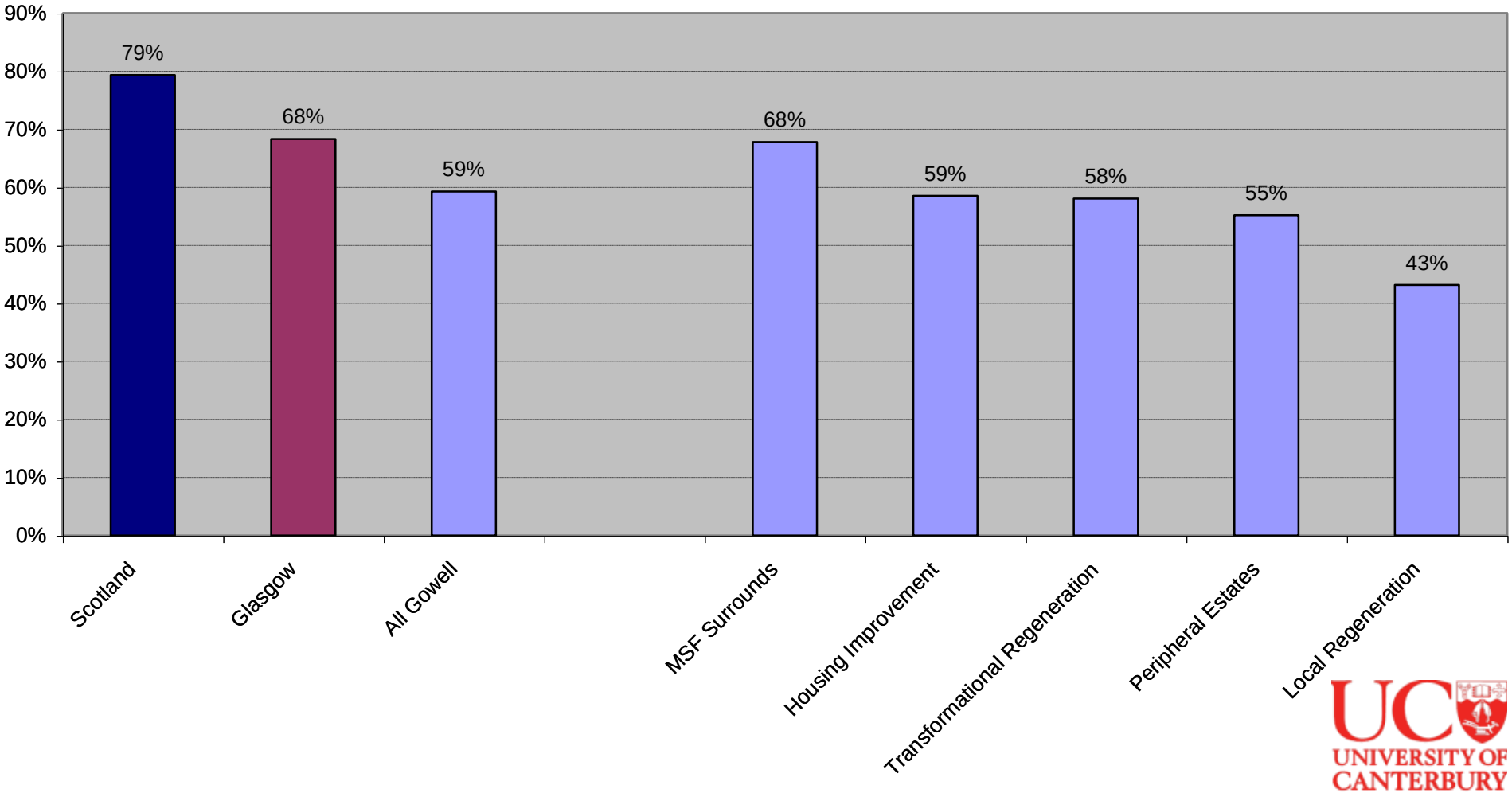
Survival to 65, by area type

% of 15 year-old boys surviving to 65 by area type, 2001/05
Source: calculated from GRO(S) mortality and CHI population data



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Research Questions

- How has walking behaviour changed?
- How has walkability changed?
- Are changes in the walkability of the neighbourhood environment associated with changes walking behaviour?

- Are there differences between ‘movers’ & ‘stayers’

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Methods

- Repeated measures survey of self report of walking (behaviour measure)
  - Frequency of walking in the local neighbourhood for at least 20 mins (days per week)
  - International Physical Activity Questionnaire (IPAQ) – walking component
- ‘Objective’ walkability scores (environment measure) matched to survey responses

Walkability score

Walkability score calculated for 2011 and 2015 (based on: Macdonald et al, 2016; Frank et al, 2009; Saelens et al, 2003)

- Connectivity (Intersection density) *2
- Dwelling density

Calculated as mean of all datazone centroids within 800m of survey respondent's home postcode

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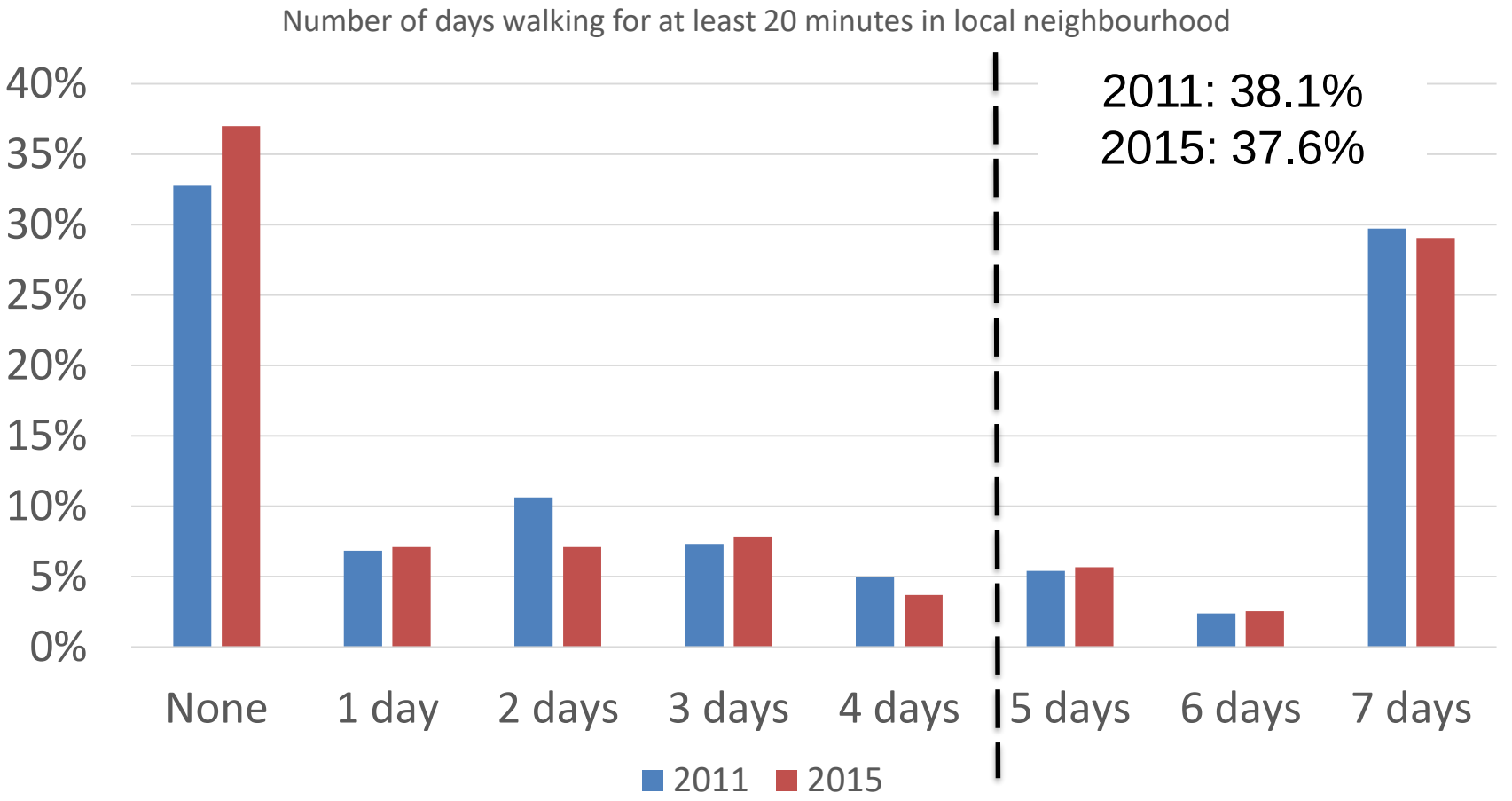
Number of days walking for at least 20 minutes in local neighbourhood



No change: 33%; Decrease: 35%; Increase 32%

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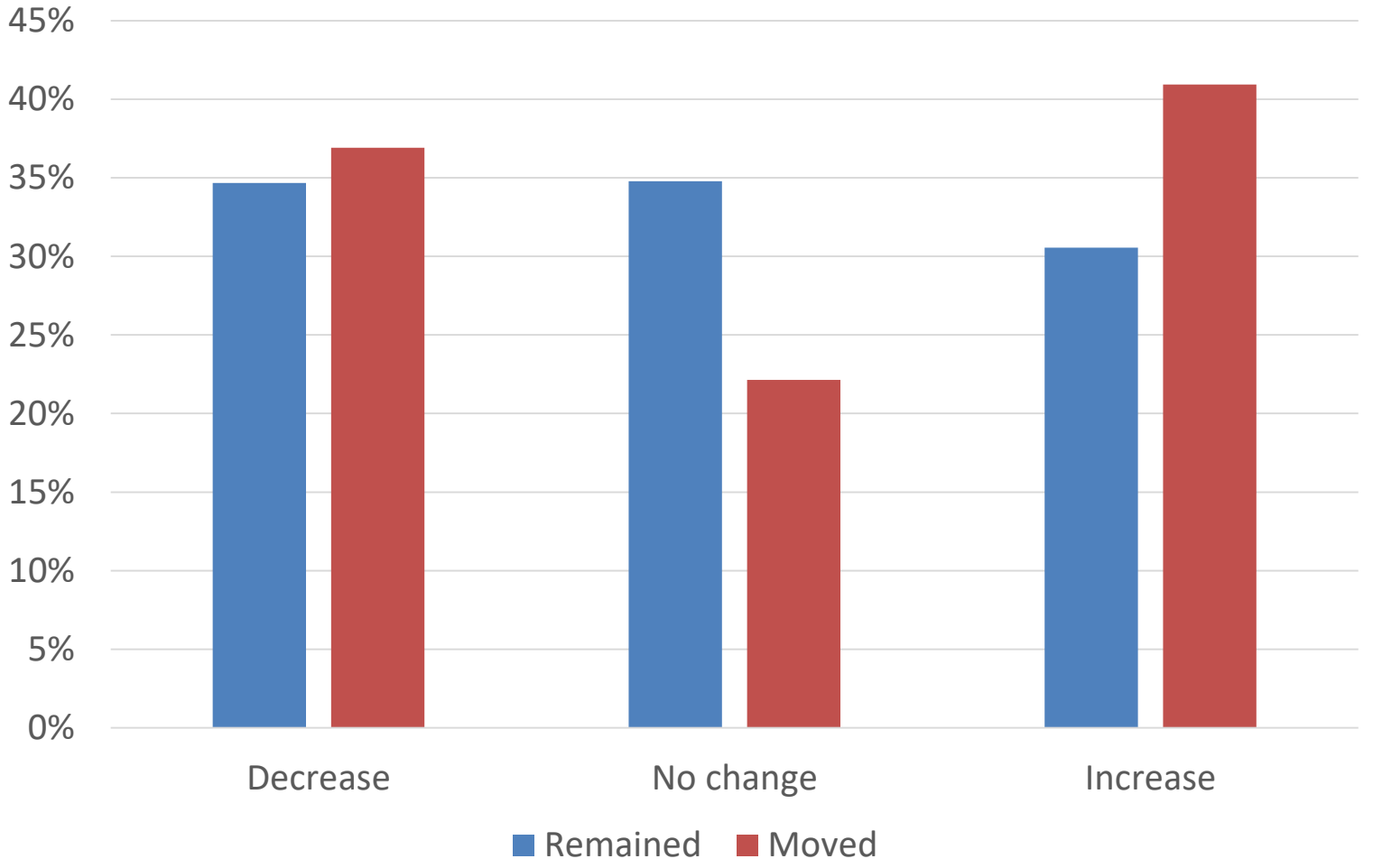
Change in number of days walking in local area by moving house vs. remaining



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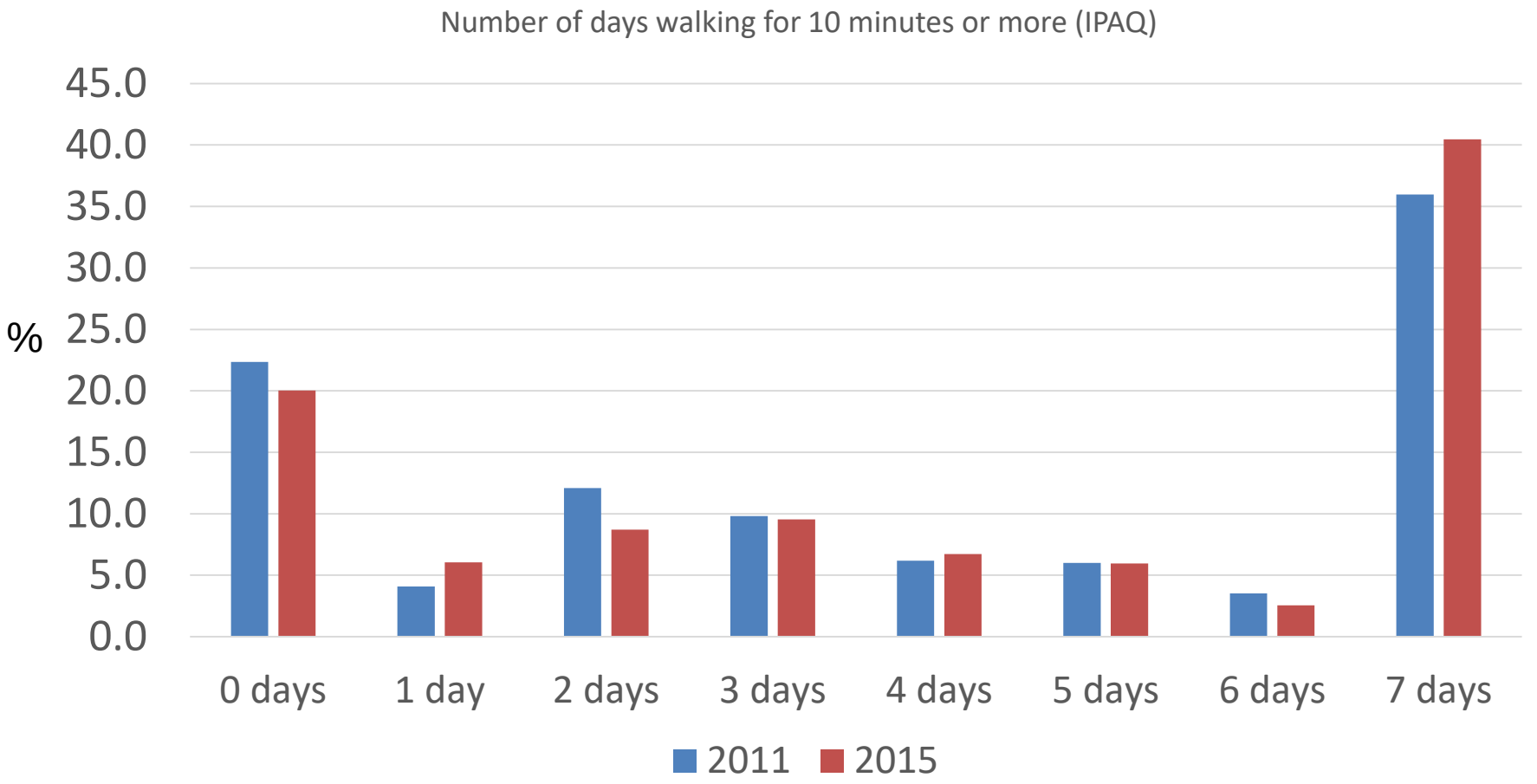
IPAQ: Days walking



No change: 31%; Decrease: 32%; Increase 37%

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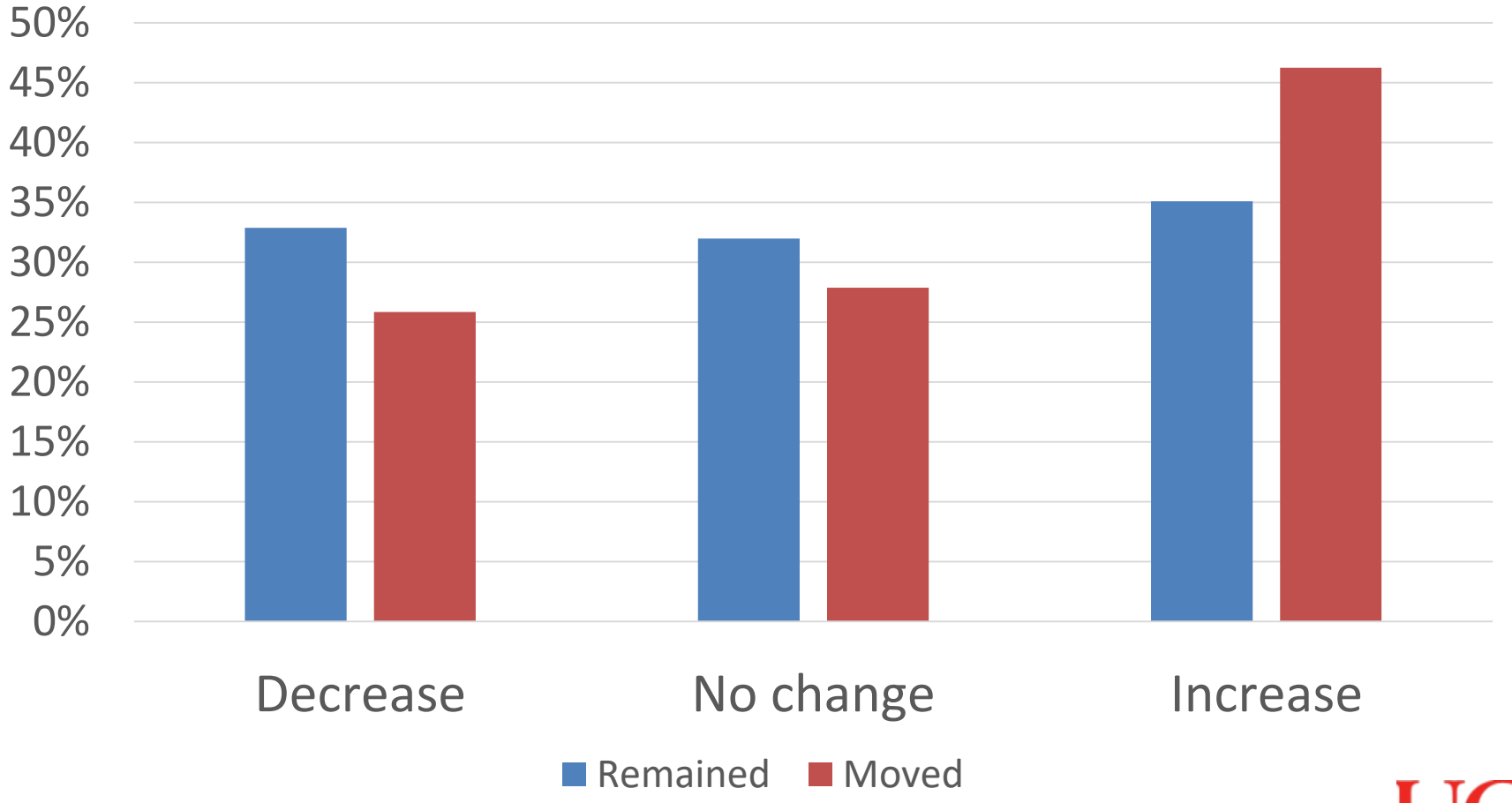
Change in number of days walking (IPAQ) by moving house vs. remaining



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IPAQ: MET minutes walking

(Walking days * walking mins per day * 3.3)

- Median MET minutes walking:

  2011: 231

  2015: 396

  (Z= -6.32,p<0.01)

- Mean *change* in MET-walking: 195.99 (1187.04) ~ 1 hour a week

  -Movers: 155.7 (1209.94)

  -Stayers: 202.55 (1183.77)

  (t=0.46, p=0.65)

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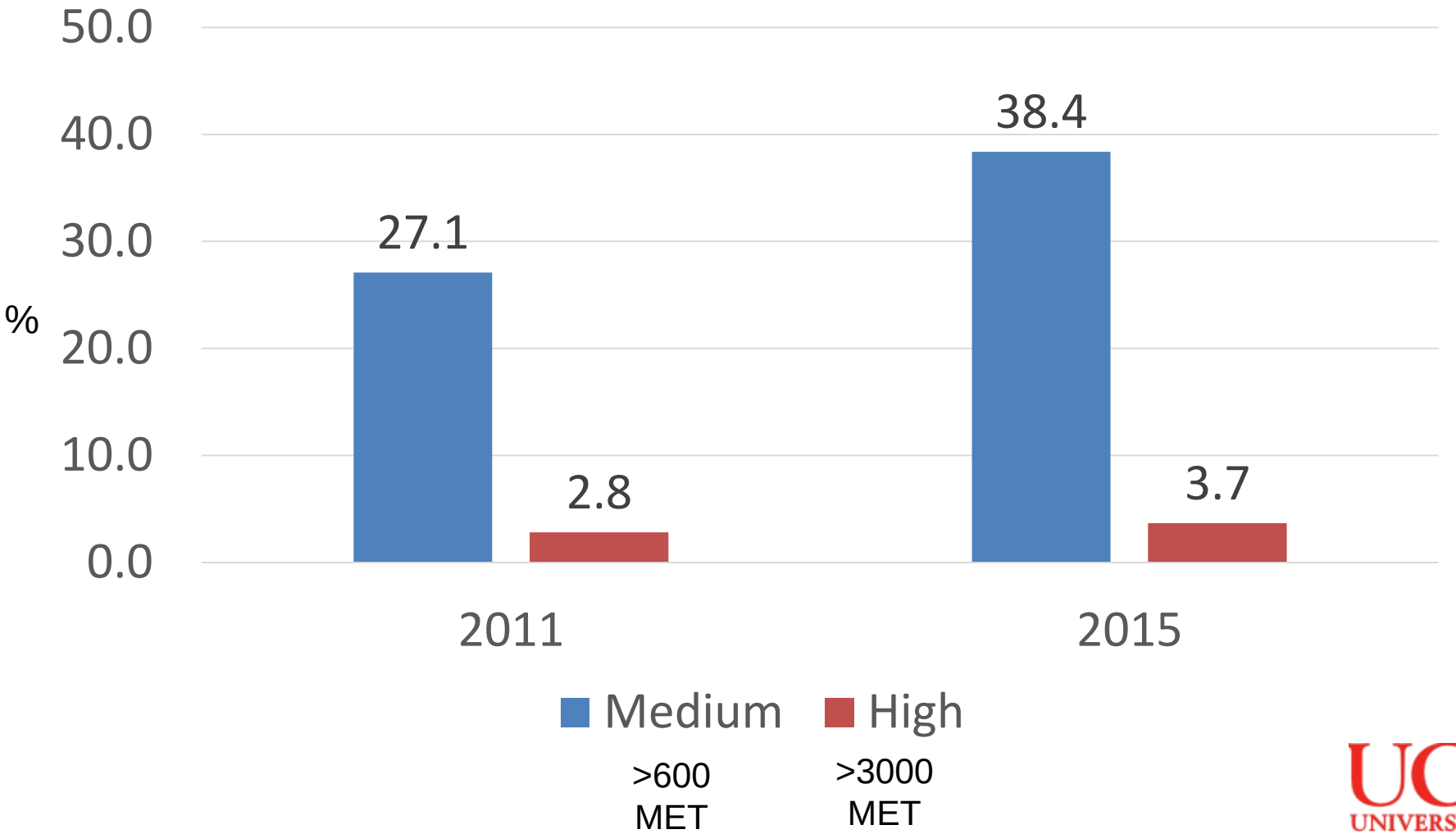
Achieving medium and high level of activity from walking (IPAQ)



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How has walking behaviour changed?

- Those who move more likely to show change (increase or decrease) in days walked
- Increase in total walking minutes per week across the whole sample ~ not significantly different between movers and stayers
- Increase in those achieving medium and high levels of physical activity, solely from walking

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Changes in walkability

	2011	2015	Mean Change
Dwelling Density	33.54 (13.29)	33.32 (12.87)	-0.21 (6.86) (t=-1.02, p=0.31)
Intersection Density	1.82 (0.65)	1.95 (0.61)	0.14 (0.55) (t=8.17, p<0.01)
Walkability score (standardised)	1.12 (1.32)	1.28 (1.28)	0.16 (0.78) (t=6.62, p<0.01)

Movers +0.32
Stayers +0.13
(t=2.77, p=0.06)

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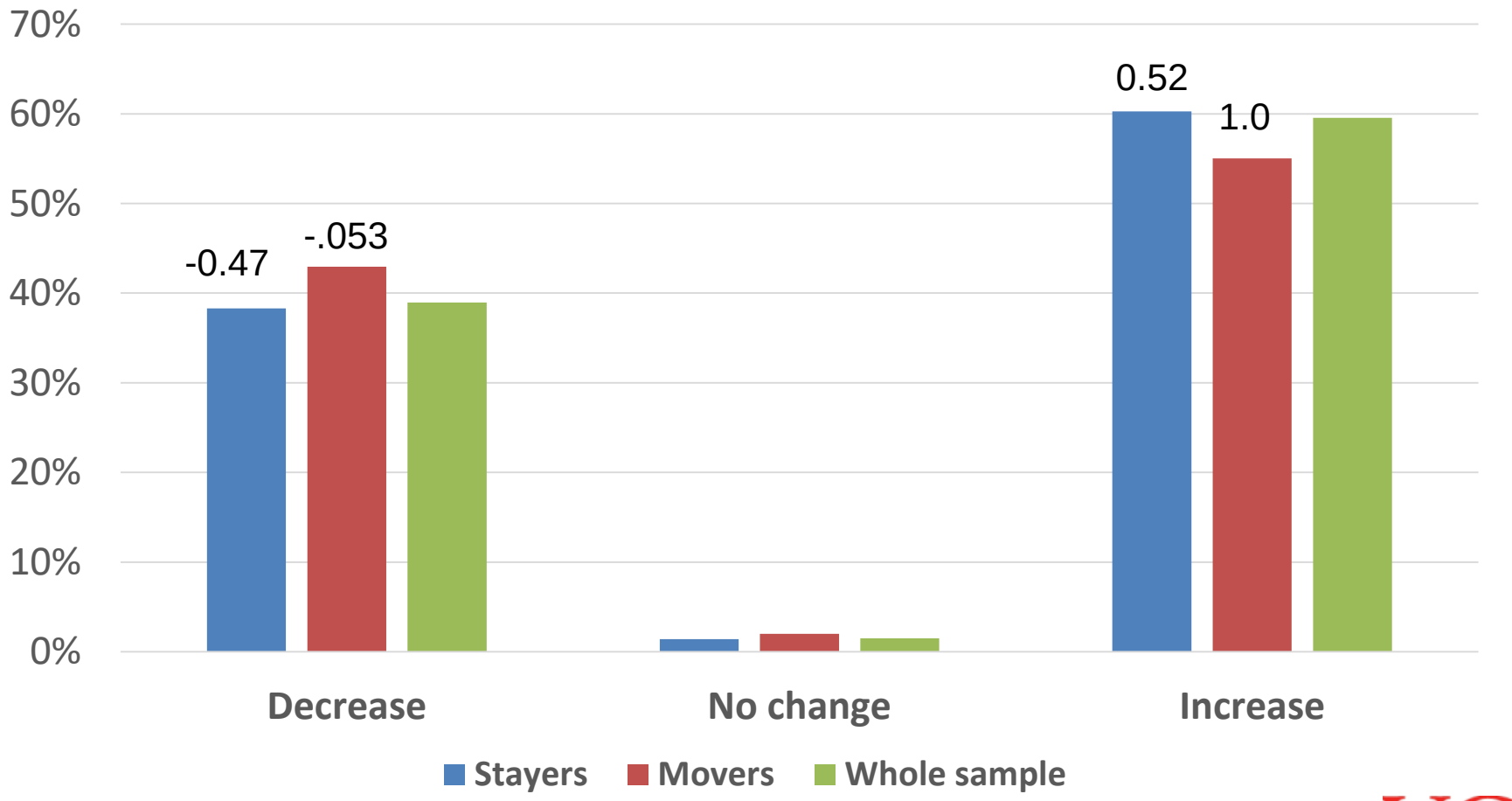
Changes in walkability



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How has walkability changed?

- Increased walkability overall
- Those who moved have larger changes in walkability (increase or decrease)

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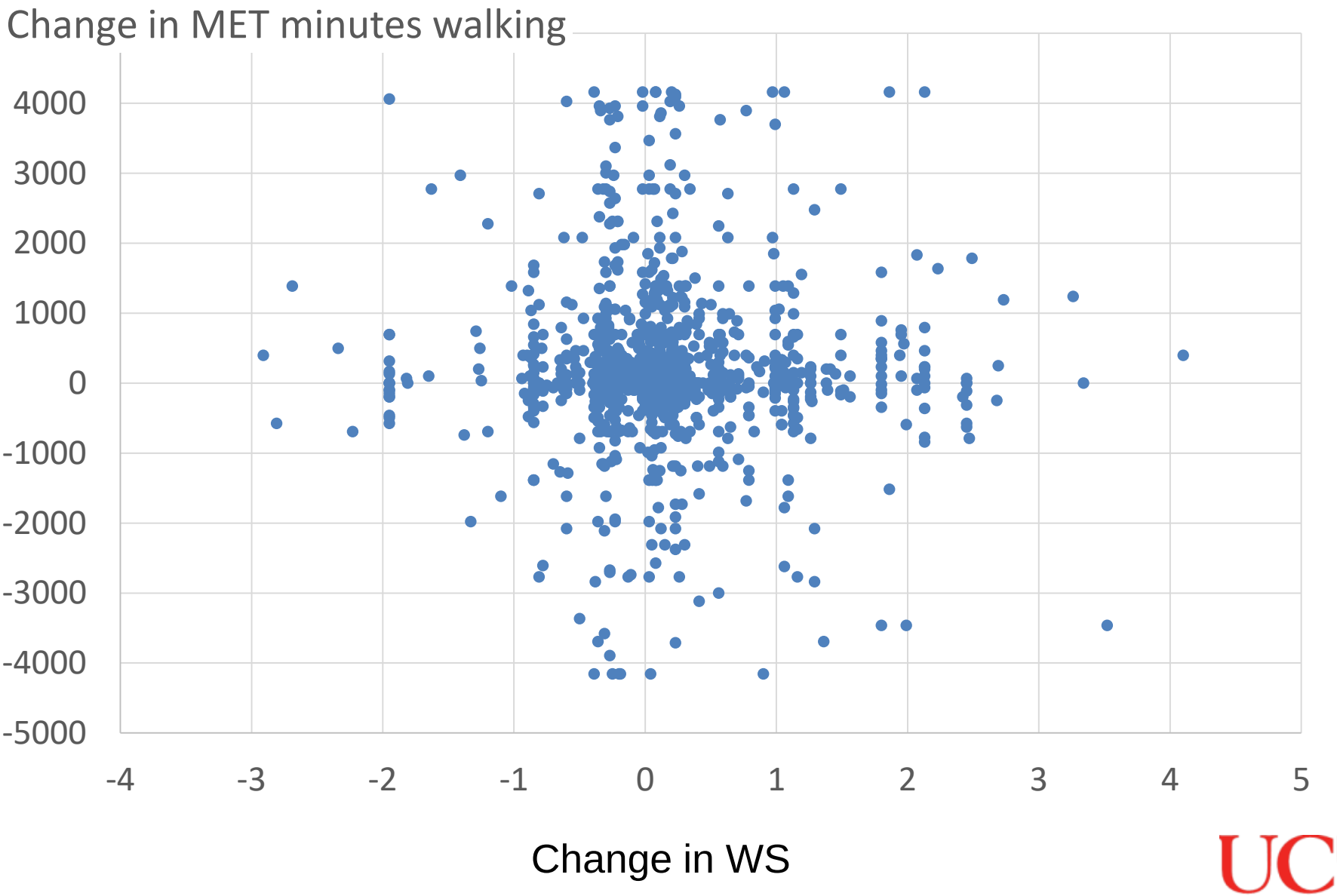

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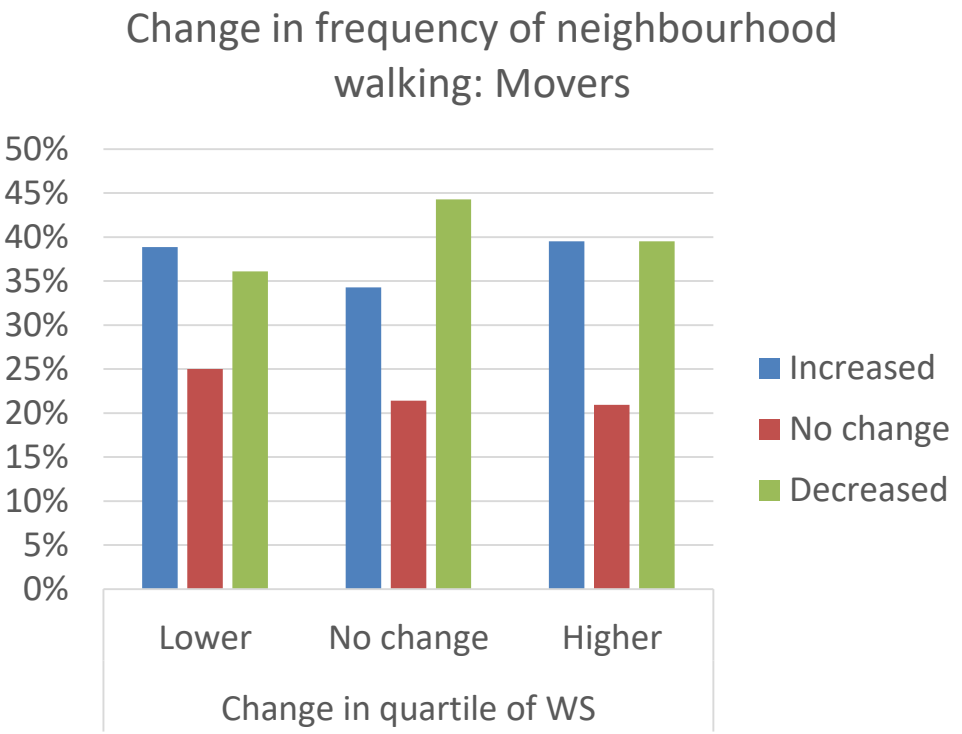

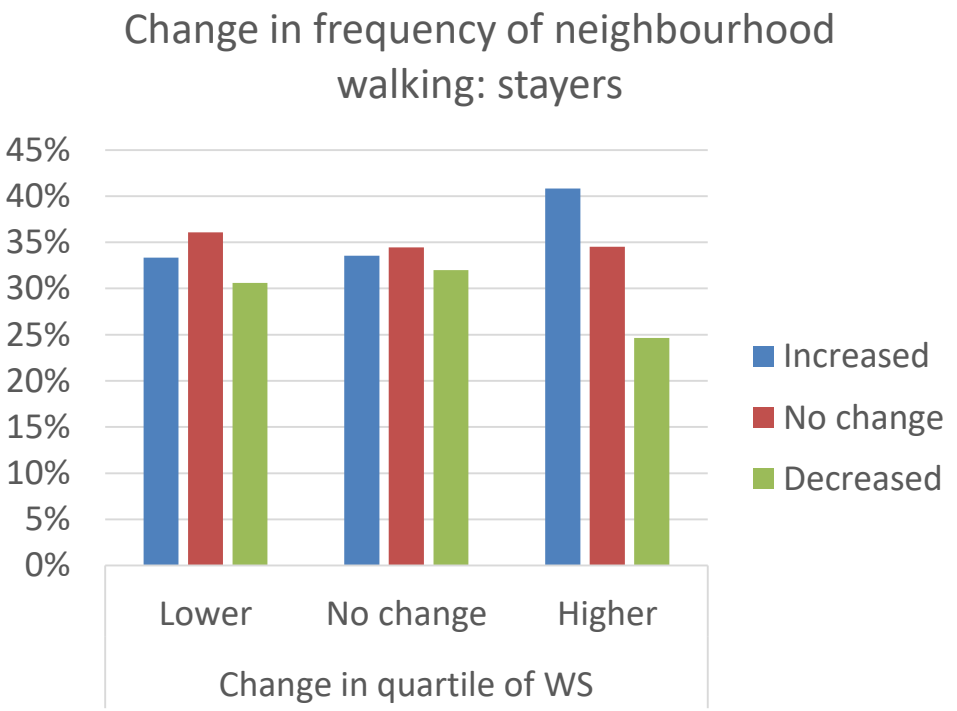

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Relationship between change in walkscore and walking behaviours….

- Neighbourhood walking on 5+ days (2015) ✖
- Increase in walking days ✖
- Decrease in walking days ✖
- Achieving medium MET minutes (2015) ✖
- Achieving high MET minutes (2015) ✖
- Increase in MET minutes ✖
- Decrease in MET minutes ✖

Why not…?

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1) Why not…

- Not enough variation , changes are too small
- Non-linear effect of “walkability” on walking (Christiansen et al, 2006)
- Other things are more important
- Differential impact of environment for different groups (Ivory et al, 2015;Shortt et al, 2014)

2) What DOES explain changes in walking?

- Age
- Long term illness

Potential to look at:

- Use of amenities in local area
- Residential capital
- Environmental capital
- Social and community capital

(Mason et al, 2011)

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Conclusions & Further work

- Changes in both environment and walking associated with moving, but..
- Walkability ≠ Walking
- Scale and context
- What else matters for walkability – perceptions of neighbourhoods over time?
- What should be included in a measure of walkability?
- Link to health outcomes

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Any questions?

THANK YOU

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