



Why geography matters? Life course, green space & wellbeing

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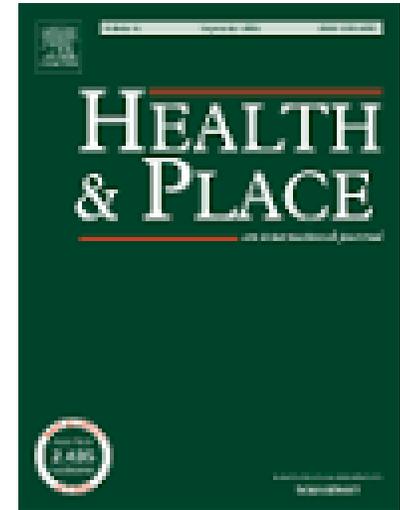
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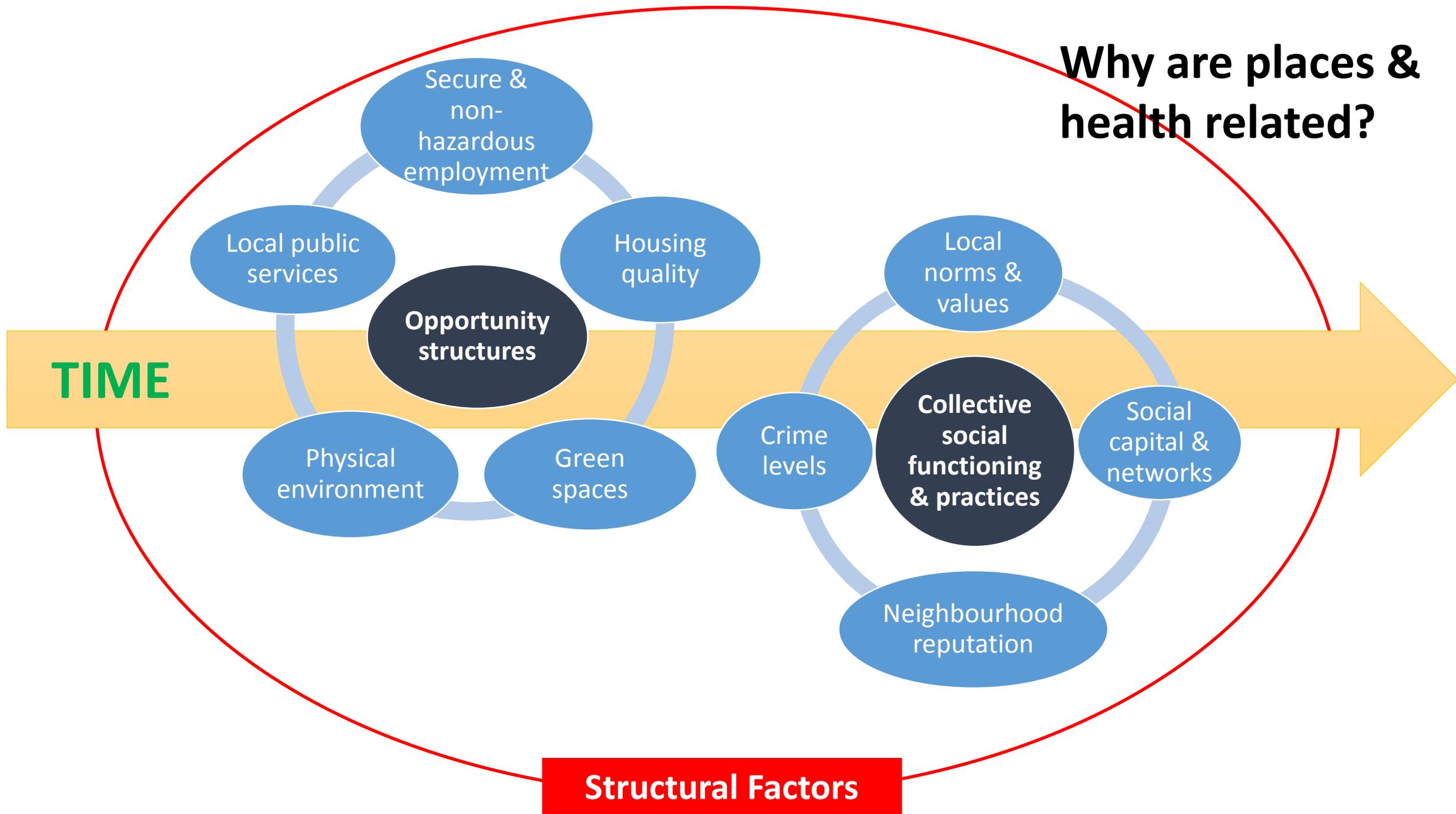
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Health & place

- Many studies examining connections between health & place
 - Physical health
 - Behaviours
 - Mental health
- Revealing – how places ‘get under the skin’
 - Policy opportunities: long term & sustainable

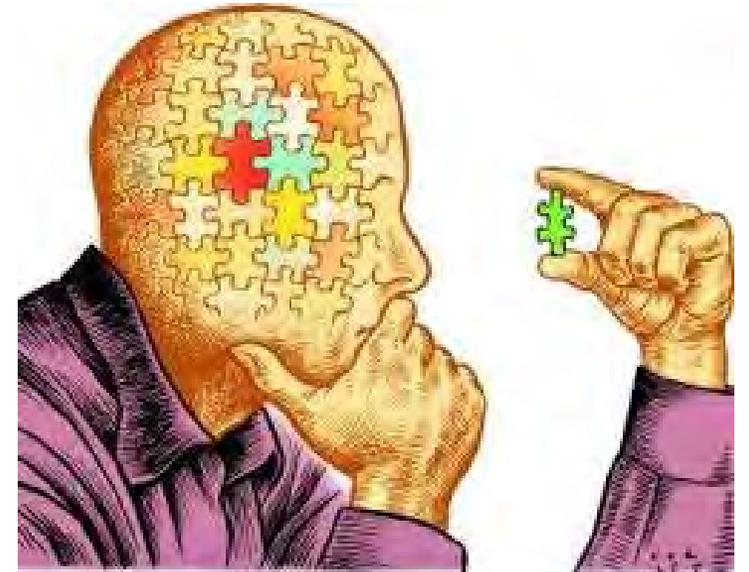


Why are places & health related?



Critiquing work on health & place

- Most work cross sectional
 - Contemporaneous exposures
 - Few longitudinal studies
- Or consider changes in very short term
 - Interventions
 - Natural experiments
- Little work examining environmental circumstances over longer periods: the life course





Two green space case studies

1. Local green space & children's social, emotional & behavioural development
2. Lifetime availability of green space & cognitive ageing



Case Study 1: Local green space and children's social, emotional & behavioural development



Local green space and children's social, emotional & behavioural development



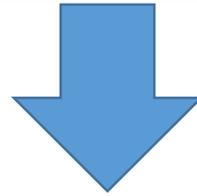
1. Are social, emotional & behavioural development better for those with more natural space around their homes?
2. Are different types of natural space (park space & private garden) more important?
3. Are relationships different between:
 - boys & girls?
 - household educational status?



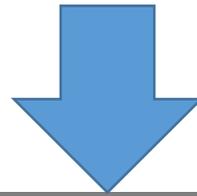
Growing Up in Scotland (GUS) survey



- GUS: nationally-representative birth cohort
- Selected in 2005/2006 (n=5,217) from families with babies (c. 12 months)
 - followed up annually



- Selected respondents from wave five (age 5; n=3,833)
- 2,909 children (76%) living in areas covered by urban natural space data



- Retained the children in wave 4 & 6 survey data if living at wave 5 address (additional 2,650 & 2,482 observations)

Outcome measures

Social, emotional & behavioural difficulties assessed using 25-item

Strengths & Difficulties

Questionnaire (SDQ)

- behavioural screening tool designed for children aged 3-16
- Higher scores indicated worse problems (opposite for Prosocial Behaviour)



Table 1. Items within the Strengths and Difficulties Questionnaire (SDQ) domains.

SDQ Domain	Items
Hyperactivity Problems	Restless, overactive, cannot stay still for long Constantly fidgeting or squirming Easily distracted, concentration wanders Thinks things out before acting Sees tasks through to the end, good attention span
Emotional Problems	Often complains of headaches, stomach aches or sickness Many worries, often seems worried Often unhappy, downhearted or tearful Nervous or clingy in new situations, easily loses confidence Has many fears, is easily scared
Peer Problems	Rather solitary, tends to play alone Has at least one good friend Generally liked by other children Picked on or bullied by other children Gets on better with adults than with other children
Conduct Problems	Often has temper tantrums or hot tempers Generally obedient, usually does what adults request Often fights with other children or bullies them Often lies or cheats Steals from home, school or elsewhere
Prosocial Behaviour	Considerate of other people's feelings Shares readily with other children Helpful if someone is hurt, upset or feeling ill Kind to younger children Often volunteers to help others (parents, teachers, other children)



Natural space measures:

- Quantified area of public parks & total natural space around each child's home
 - using 2011 'Scotland's Greenspace Map'
 - 500m of each child's postcode
 - total natural space included all public & private natural surfaces
- Access to private garden - GUS

Covariates:

- **Child**: including age, sex, hours screen time
- **Household**: highest educational attainment, income, carer's mental health
- **Neighbourhood**: deprivation



Main analysis

- Neither **parks nor total natural space** were associated with the SDQ domains or their change over time
 - although an IQR increase in total natural space was associated with Prosocial Behaviour scores 0.08 points higher (i.e., better behaviour).



- Having **access to a garden** was substantially more important than local natural space:
 - significantly higher scores for Hyperactivity Problems (+0.52), Peer Problems (+0.23), Conduct Problems (+0.27), and Total Difficulties (+1.15)

Household education

- **Key question:** can natural space help reduce SES inequalities in early childhood development?
- Overall results suggest children from low-education households may benefit from:
 - natural space (some outcomes)
 - **particularly garden access**
- No garden access associated with:
 - significantly higher levels of Hyperactivity (+0.56), Conduct Problems (+0.26), & Total Difficulties (+1.11) for **children from low education** but not high education households.



So what does longitudinal work contribute?



- Some evidence neighbourhood natural space **may reduce social, emotional & behavioural difficulties** for 4-6 year olds
 - private garden access most beneficial
- Natural space may facilitate beneficial **social interactions** among young children
- Little evidence natural space influenced **trajectory of development** change 4-6 years
 - beneficial influences may occur at younger ages
- Having a garden – sizable benefits
 - par with advantages of girl v boy, or £20-50,000 increase in household income



Case Study 2: Lifetime availability of green space & cognitive ageing



Research focus



- Examine associations between lifetime availability of **green space & cognitive ageing**
- Are there **critical periods** for green space exposure?
 - Childhood
 - Early adulthood
 - Late adulthood
- Are there **accumulative effects** of green space exposure?



Lothian Birth Cohort 1936

13. John is younger than Jim, and Jim is younger than Bill. Which is the oldest of the three? (John, Jim, Bill)

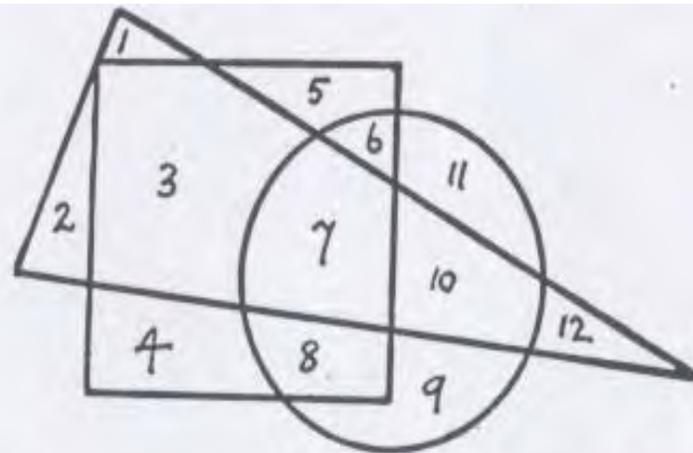
(Do not write anything, just underline the right one in the bracket).

In a certain secret writing

lzqkcofu, fttr yggr means
STARVING, NEED FOOD

In the same secret writing you find this. Write below it what it means:—

y o c t k g e t k l r t q r.



What number is in the triangle and square but not in the circle? ...

THE SCOTTISH COUNCIL FOR
RESEARCH IN EDUCATION

1947 MENTAL SURVEY TEST

SUITABLE FOR PUPILS OF
TEN AND ELEVEN YEARS OF AGE

MENTAL SURVEY TEST, 8 pp., 4d.

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SPECIMEN SET - 9d., post free

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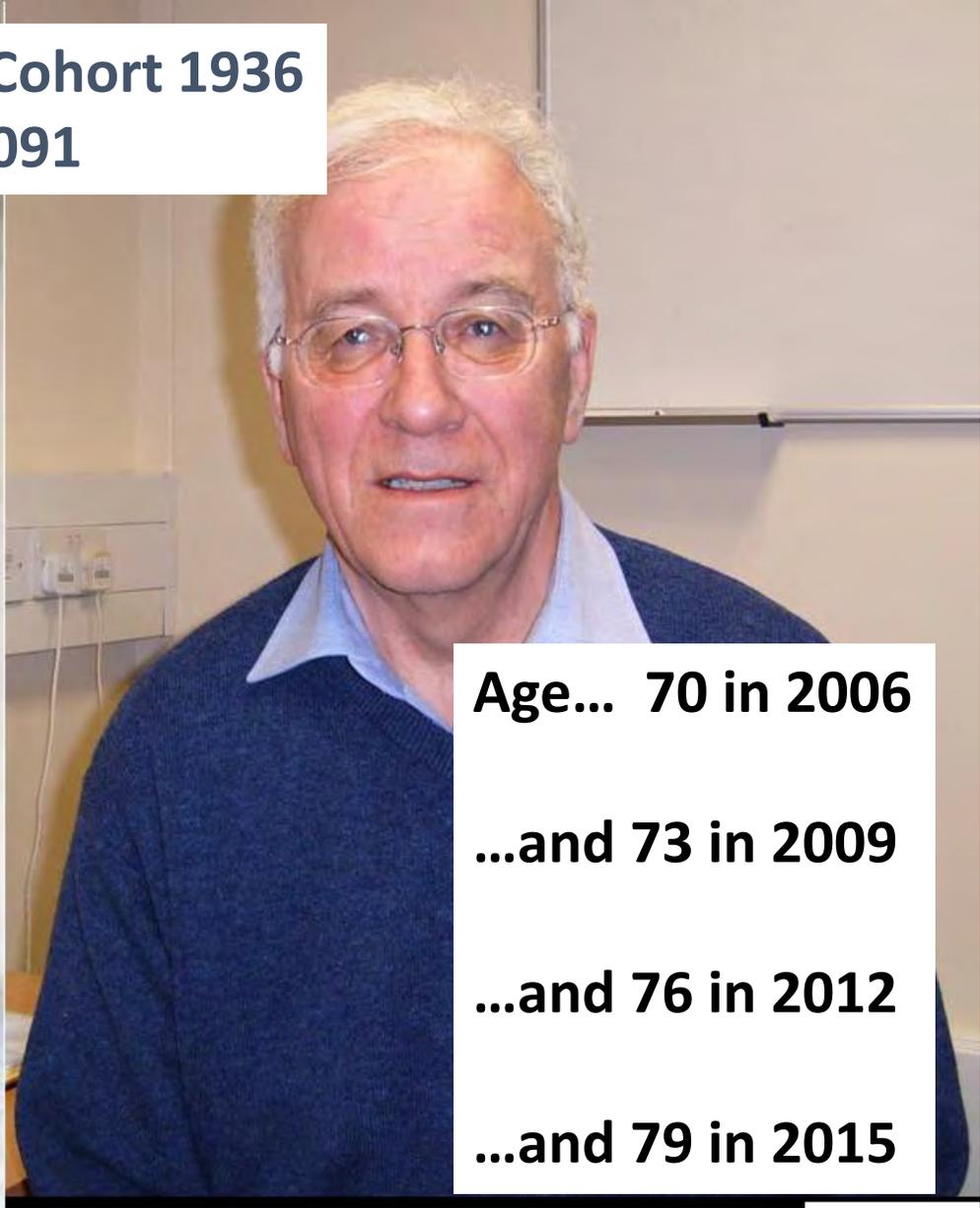
WAR-TIME ADDRESS:

ST HUGH'S SCHOOL, BICKLEY, KENT

Lothian Birth Cohort 1936
N = 1091



Age 11 in 1947



Age... 70 in 2006

...and 73 in 2009

...and 76 in 2012

...and 79 in 2015

Deary et al. (2007) *BMC Geriatrics*, 7, 28.

Deary et al. (2012) *International Journal of Epidemiology*, 41, 1576-1584.

LBC
1936



'Life grid' technique – local, global and personal events are used to prompt recollection of past home addresses

Year	Home address	Local/global/personal events	Work
	Write the street name, suburb and town/city of the home where you lived at the start of each decade e.g. 1930, 1940, 1950...	Major events that may help you date home address. Personal events could include the likes of marriage, birth of children, major holidays, death of parents...	Write the title of your job (or your Father's job if appropriate) at the start of each decade
1970 1972 1974 1976 1978	<i>Aylen Lea Cottages Gorgie Road Edinb.</i>	Oil crisis <i>Married</i> Margaret Thatcher becomes prime minister	<i>Self Employed</i> <i>Mobile Fruit Van</i>
1980 1982 1984 1986 1988	<i>Harrison Gardens Stratford Edinb.</i>	Falklands War <i>Father Died</i> Lockerbie bombing, Hillsborough disaster	
1990 1992 1994 1996 1998	<i>Forrester Park Gardens Edinb. EH12</i>	John Major becomes prime minister Diana Princess of Wales dies Scottish Parliament opened	<i>Self Employed</i> <i>Black Taxi Driver</i>
2000 2002 2004 2006 2008		9/11 attacks in New York	
2010 2012 2014		Earthquake and tsunami off coastal Japan	

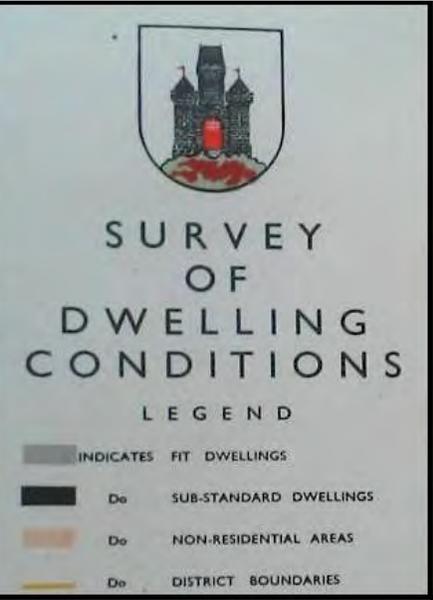
Environments, health & inequalities over the life course



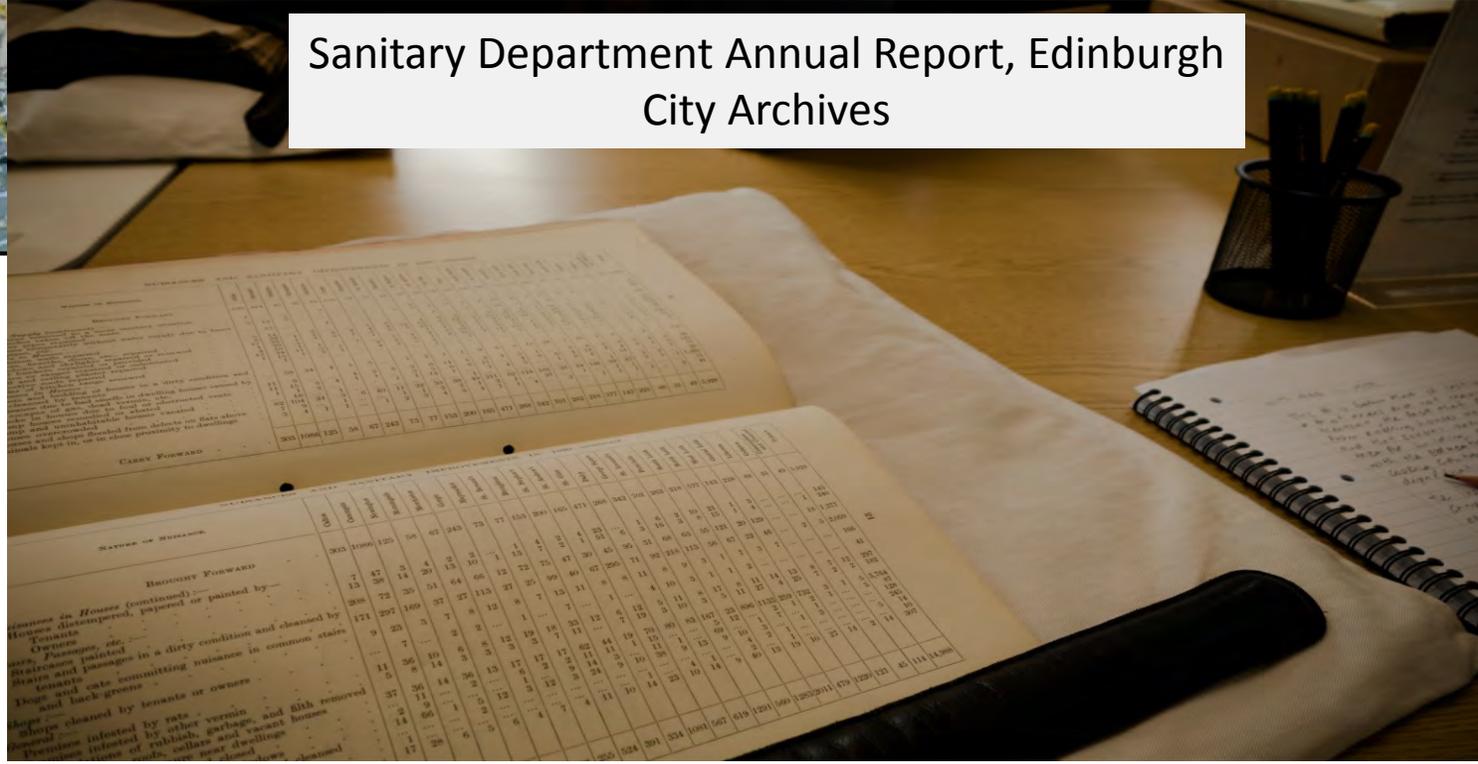
Can we 'reconstruct' past urban environments?



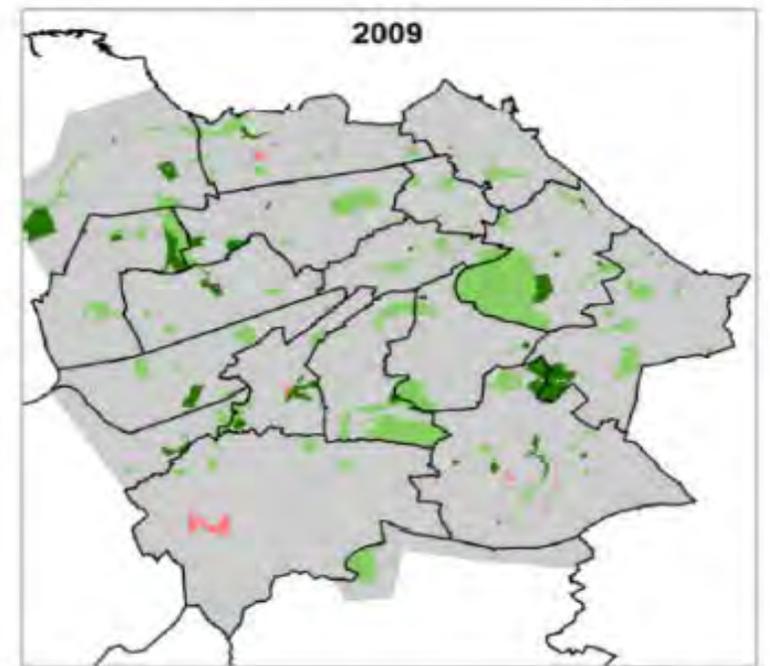
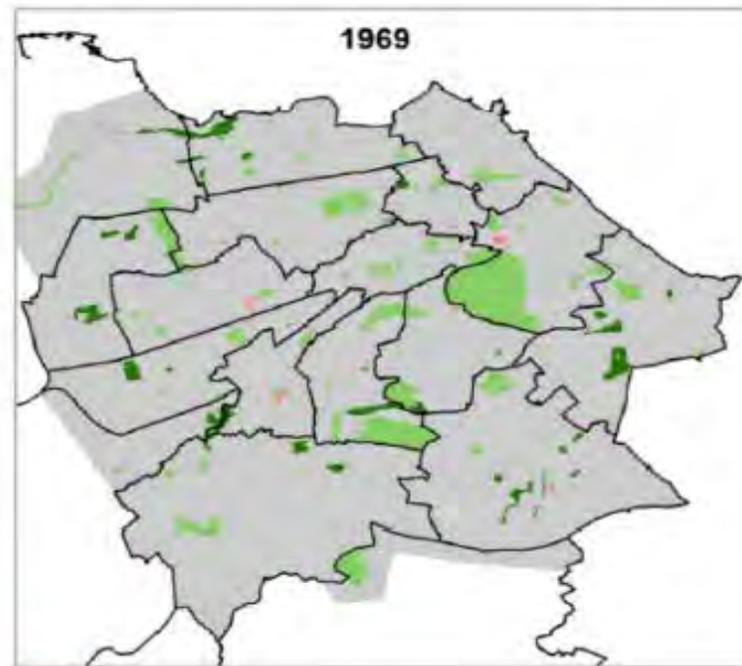
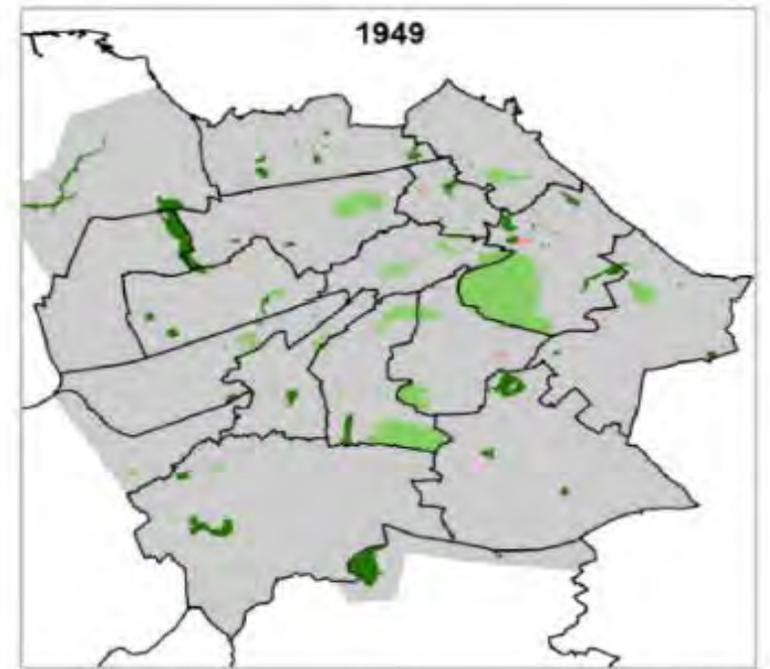
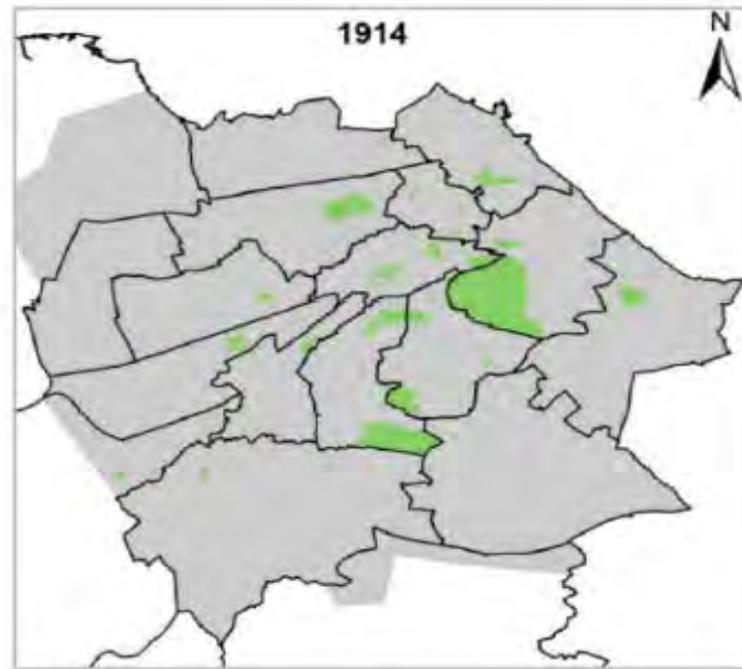
A Civic Survey and Plan for the City and Royal Burgh of Edinburgh, 1949



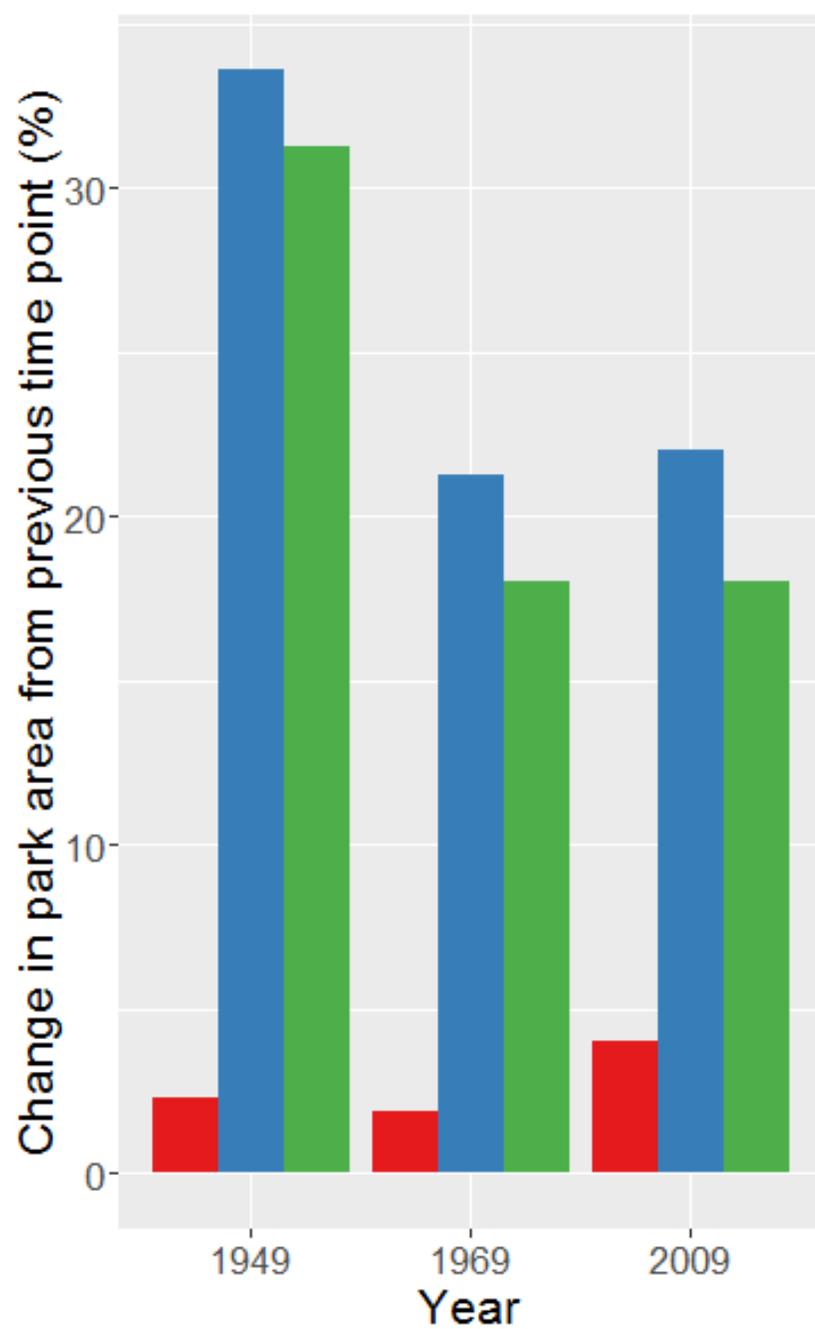
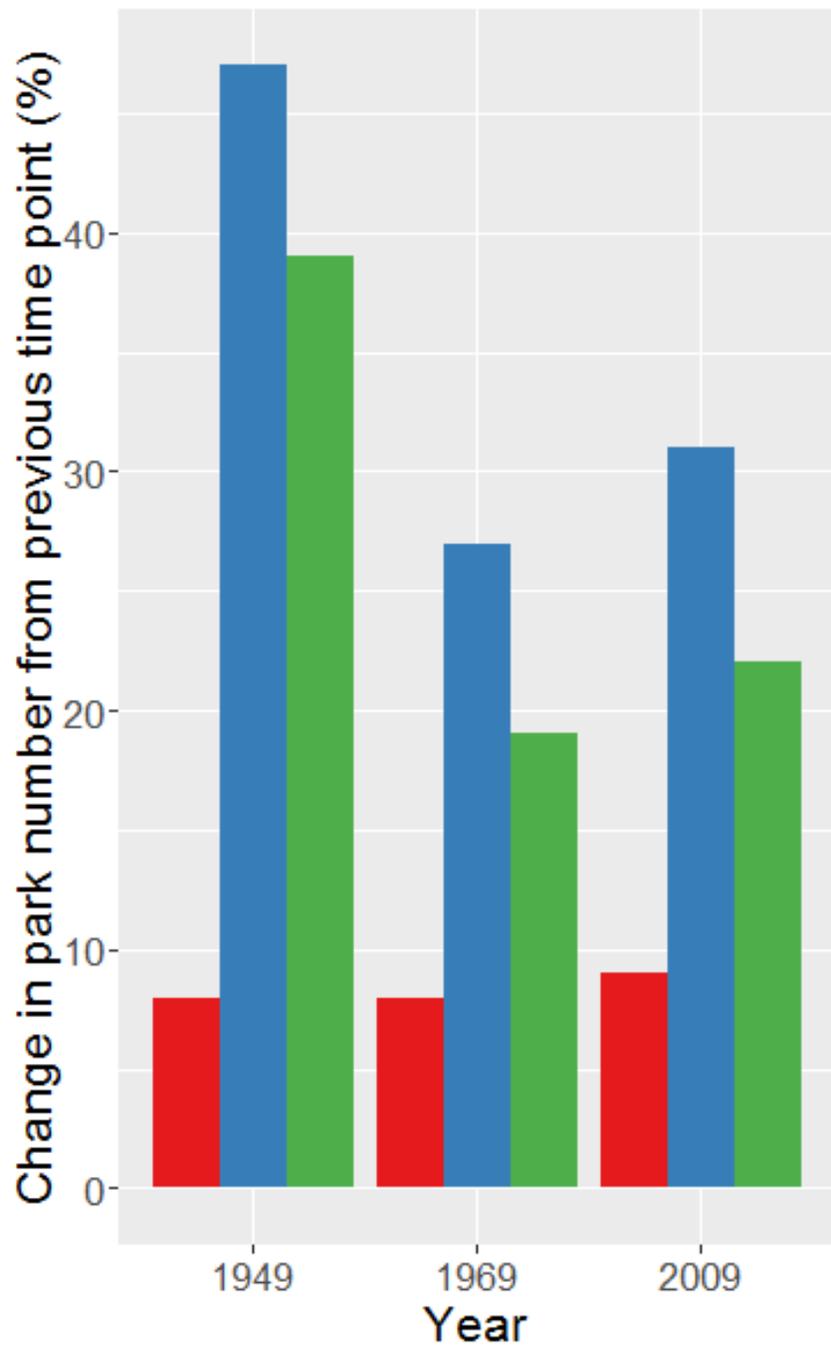
Sanitary Department Annual Report, Edinburgh City Archives

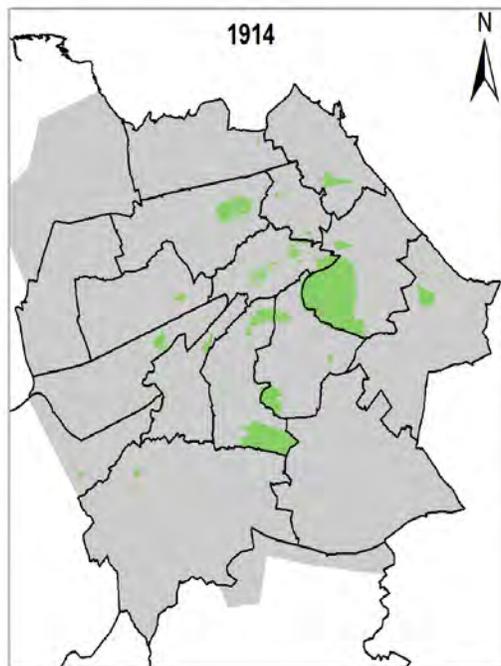


Mapping the public parks in Edinburgh in 1914, 1949, 1969 & 2009

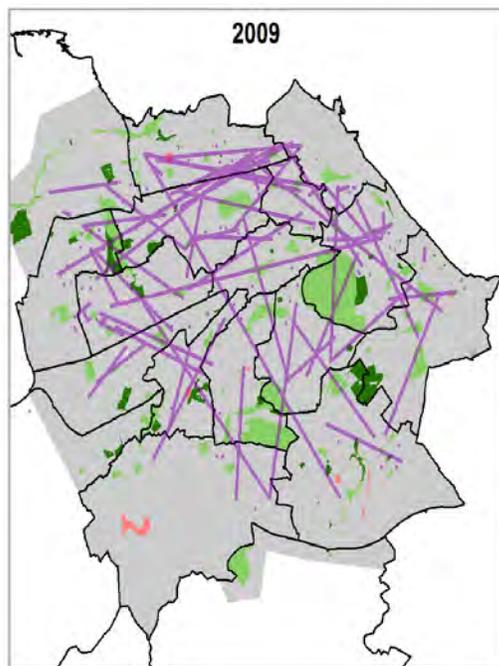


- Public park removed since previous time period
- Public park
- Additional public park since previous time period
- Survey extent
- Ward boundary (2001)





- Public park removed since previous time period
- Public park
- Additional public park since previous time period
- Survey extent
- Ward boundary (2001)
- Residential Trajectory



Life course models



- Accumulation models
- Critical periods models
- Effect modification models

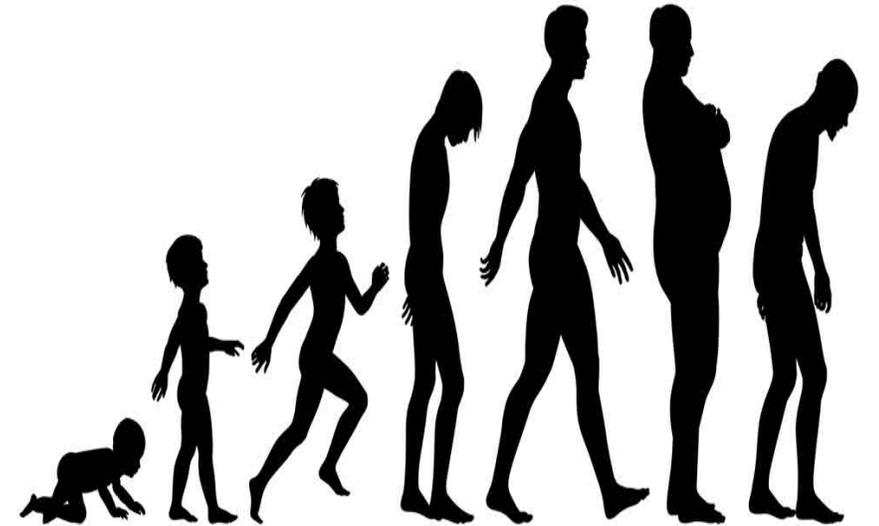




Cognitive ageing: outcome measures



- Moray House Test (MHT) scores
 - ages 11, 70 & 76
- 71 items: variety of mental tasks including arithmetic, following directions & word classification





Findings: cognitive ageing

Green space - **no association** with change in cognitive test score 11-70

Green space - **positive association** with change in cognitive test score 70-76

- “Early effect modification” model had best fit
- Suggests **childhood a particularly sensitive period** to green space availability: affecting cognitive function trajectory in later life
 - enhanced by more neighbourhood green space in adulthood
- Strongest amongst women, & those in a ‘manual social class’



Conclusions

- Why does health vary between places?
 - Multi-scalar, interdependent place-based processes across the life course
- Historical context rarely acknowledged in health inequalities research
 - lacks robust evidence & data
 - 'Life course of place'
- Combined cohort & historical environmental data in Edinburgh
 - Green spaces may have a lifelong association with cognitive ageing
- Not just a series of interesting historical anecdotes:
 - Robust evidence
 - Fostering resilience (equigenesis)
 - Enhance Scotland's health and reduce unenviable record on inequalities



Acknowledgements

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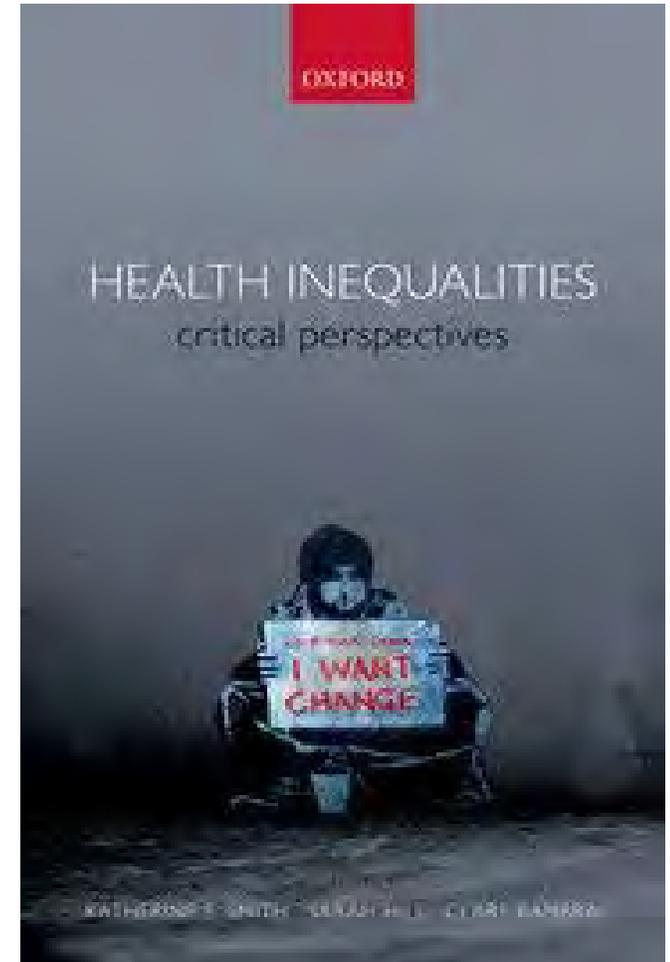
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Descriptive analysis

- Children - average of 63% natural space within 500 m of home
- 94% garden access
- Those without access to garden: significantly less total natural space
- Socially patterned: garden access more common
 - least deprived neighbourhoods ($\chi^2=82.5$, $p<0.001$)
 - most educated households ($\chi^2=37.1$, $p<0.001$).

Table 2. Individual, household and neighbourhood characteristics for the 2,909 children in the sample, as at wave five.

Level	Characteristic	Mean (95% CI)	Count (%)
Individual	Age (years)	4.85 (4.85, 4.85)	
	Sex		
	Male		1,478 (51)
	Female		1,431 (49)
	Screen time (hours)	2.38 (2.32, 2.44)	
	Missing		708 (24)
	SDQ score:		
	Hyperactivity Problems	3.69 (3.60, 3.77)	
	Missing		32 (1)
	Emotional Problems	1.25 (1.19, 1.30)	
	Missing		24 (1)
	Peer Problems	1.05 (1.00, 1.10)	
	Missing		23 (1)
	Conduct Problems	1.70 (1.65, 1.76)	
	Missing		23 (1)
	Total Difficulties	7.67 (7.50, 7.84)	
	Missing		37 (1)
Prosocial Behaviour	8.22 (8.16, 8.28)		
Missing		24 (1)	
Dental caries			
Yes		220 (8)	
No		2,689 (92)	
Household	Highest educational attainment:		
	Degree		1,108 (38)
	Vocational qualification		1,109 (38)
	Higher/Standard grade		406 (14)
	Other/no qualification		135 (5)
	Missing		151 (5)
	Access to a garden?		
	Yes		2,740 (94)
	No		166 (6)
	Missing		3 (0)
Equivalised household income (£000s)	24.08 (23.61, 24.55)		
Missing		157 (5)	
Carer's mental health score (SF12)	50.34 (50.00, 50.69)		
Missing		20 (1)	
Neighbourhood	SIMD quintile:		
	Quintile 1 (least deprived)		741 (25)
	Quintile 2		424 (15)
	Quintile 3		480 (17)
	Quintile 4		608 (21)
	Quintile 5 (most deprived)		656 (23)
	Total natural space (% within 500 m)	63.07 (62.58, 63.55)	
Park space (% within 500 m)	4.69 (4.44, 4.94)		

CI, Confidence interval

SF12, Short-Form Health Survey

SIMD, Scottish Index of Multiple Deprivation

Stratification by sex

Boys

- SDQ scores - not related to total natural space
- Some domains **related to park space & garden access**
 - e.g. boys with garden access had reduced Peer Problems (-0.29), Conduct Problems (-0.34) & Total Difficulties (-1.18)



Girls

- SDQ scores - on some domains - related independently to **total natural space & garden access** *but not park space*
 - e.g. more (IQR) natural space around girls' homes associated with fewer Hyperactivity Problems (-0.15), Peer Problems (-0.08) & Total Difficulties (-0.31), & more Prosocial Behaviour (+0.14)