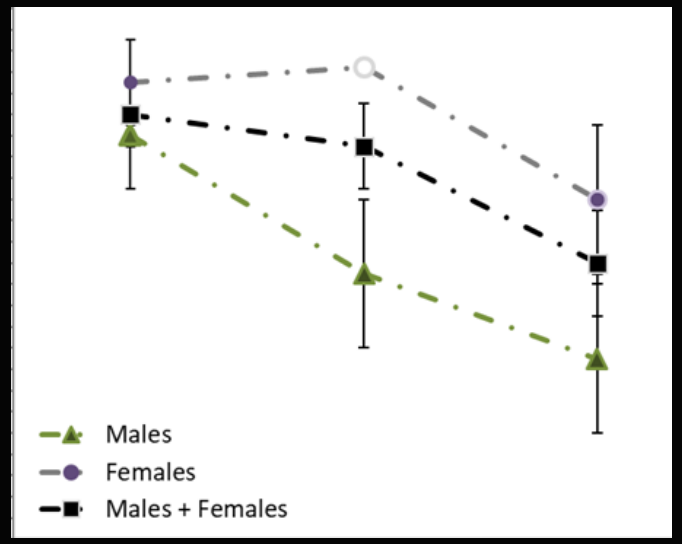
Green Space Quantity and Mental Health: Evidence on Gender Differences in Relationships and use of Work Status as a Proxy for Exposure



Dr Lynette Robertson,

Prof Catharine Ward Thompson, Prof Jenny Roe, Prof Peter Aspinall, Prof David Miller

Introduction

Methods

Results

- Part 1: Green space quantity (GSQ) effect sizes (Mental Health)
    - (i) gender differences
    - (ii) work status as a proxy for exposure
    - (iii) screening outliers and exceptional cases
- ~~Part 2: Factors underlying gender differences in GSQ-MH relationships~~

Discussion

Conclusions

Introduction

green
HEALTH

The James
Hutton
Institute

open
space

CRESH

BioSS

ELSEVIER

Landscape and Urban Planning

Volume 105, Issue 3, 15 April 2012, Pages 221-229

More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patterns

Catharine Ward Thompson [a], Jenny Roe [b, 1], Peter Aspinall [b, 2], Richard Mitchell [c, 3], Angela Clow [d, 4], David Miller [e, 5]

Int. J. Environ. Res. Public Health **2013**, *10*(9), 4086-4103; doi:10.3390/ijerph10094086 Open Access Article

Green Space and Stress: Evidence from Cortisol Measures in Deprived Urban Communities

Jenny J. Roe [1,*], Catharine Ward Thompson [2,†], Peter A. Aspinall [1,†], Mark J. Brewer [3,†], Elizabeth I. Duff [3,†], David Miller [4,†], Richard Mitchell [5,†] and Angela Clow [6,†]

International Journal of
Environmental Research and Public Health

MDPI

Article

Mitigating Stress and Supporting Health in Deprived Urban Communities: The Importance of Green Space and the Social Environment

Catharine Ward Thompson [1,*], Peter Aspinall [2], Jenny Roe [3,4], Lynette Robertson [5] and David Miller [6]

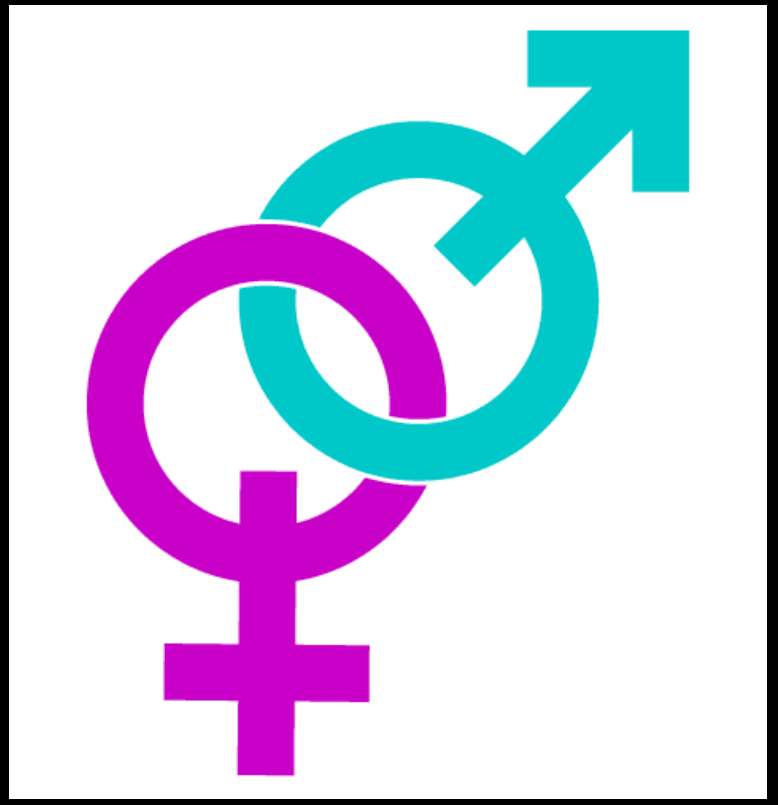
Int. J. Environ. Res. Public Health **2016**, *13*(4), 440; doi:10.3390/ijerph13040440

Open Access Article

green HEALTH

Research objectives

1. Examine **gender differences** in green space quantity (GSQ) – mental health relationships



Research objectives

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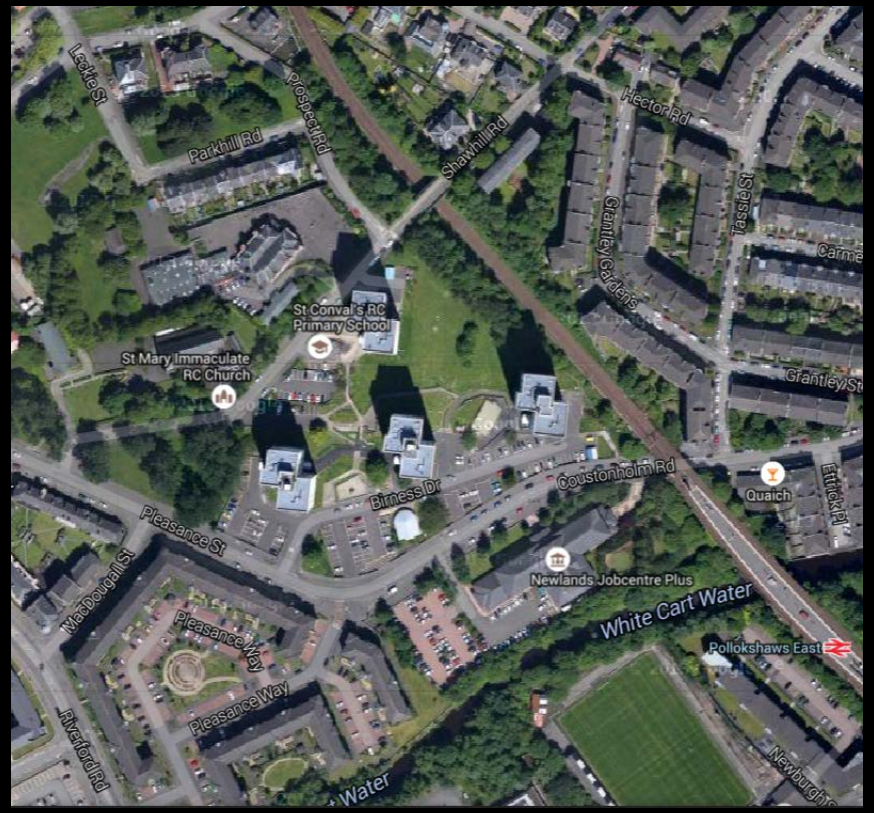
2. Explore use of **work status as a simple proxy for exposure** to the local neighbourhood environment



Research objectives

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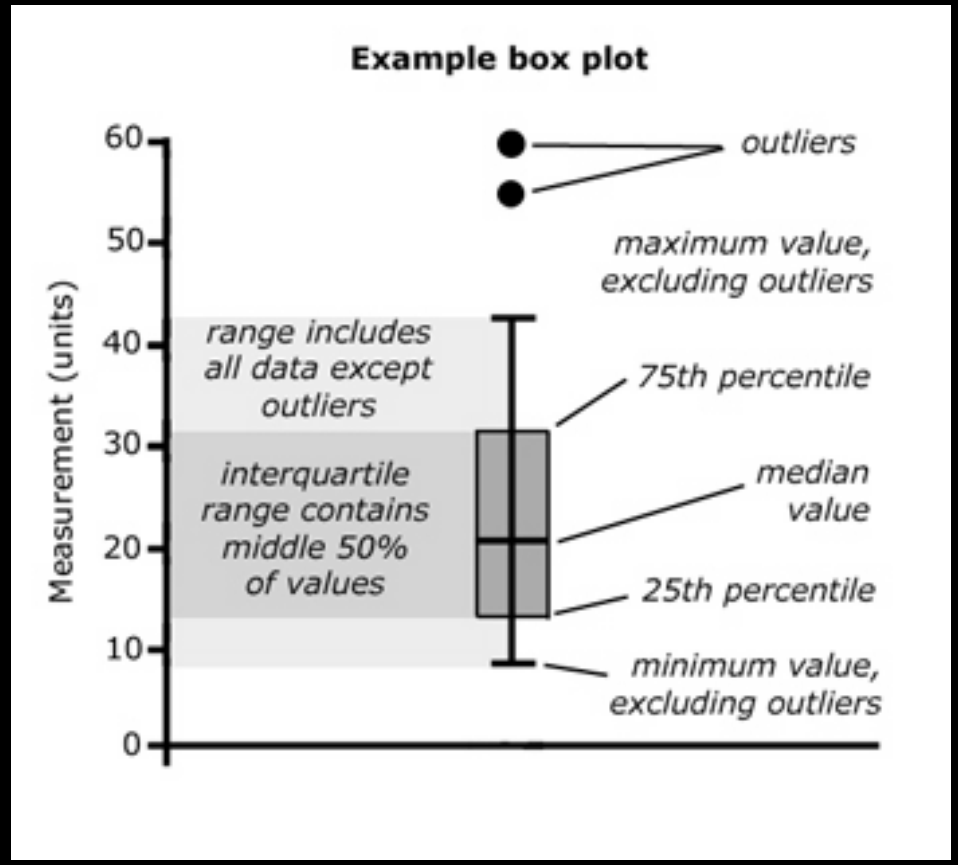
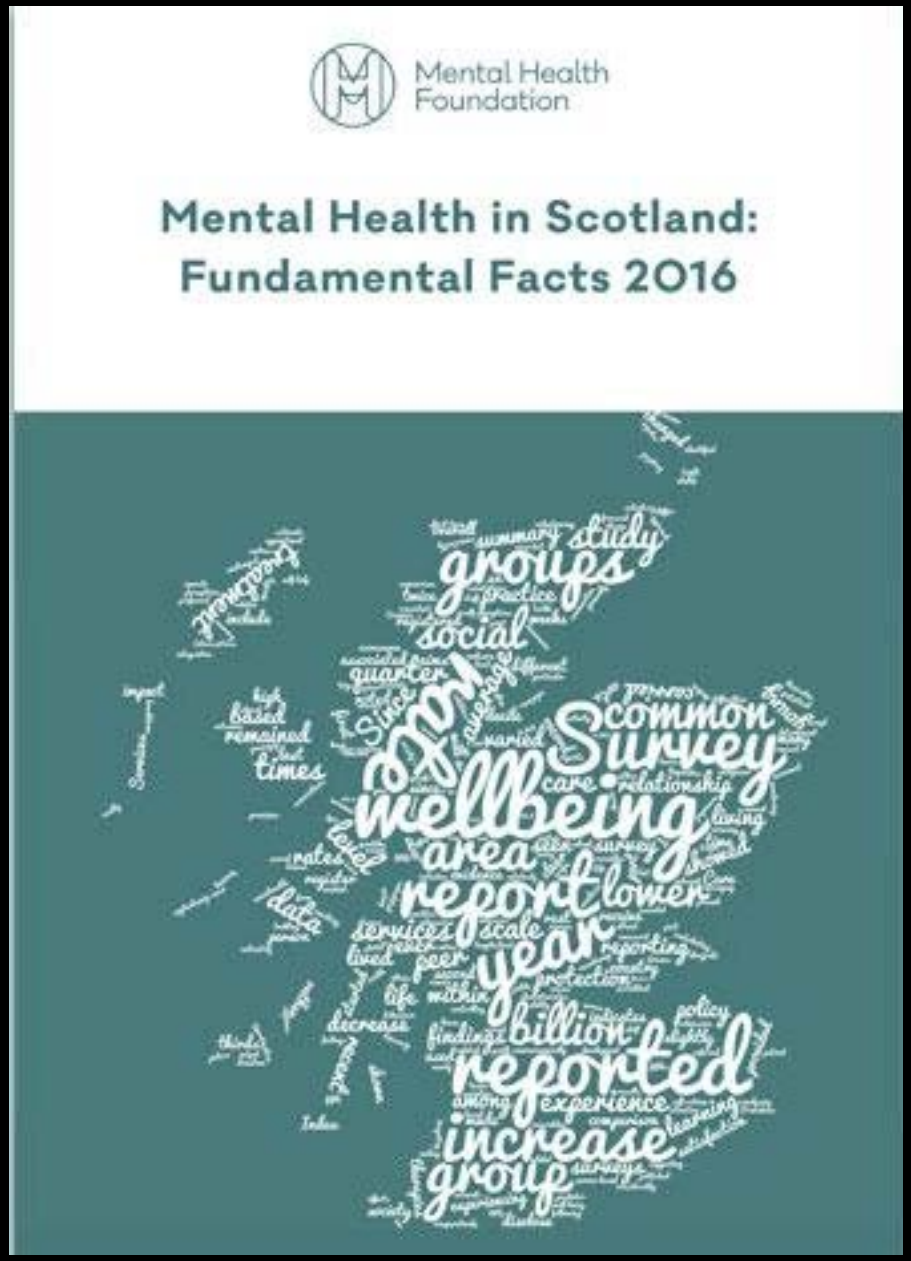
3. Examine the impact of removal of **outliers** and **exceptional cases** on findings



Poverty in Scotland at worst levels in 30 years: 1/3 population living in multiple deprivation (UK Poverty and Social Exclusion Survey 2013)

1 in 3 people are estimated to be affected by mental illness in any one year (Scottish Government)

Adults living in the most deprived areas are approximately **twice as likely** to have common mental health problems as those in the least deprived areas (22% versus 11%) – (Health Scotland)



Methods

Research Design

Cross-sectional

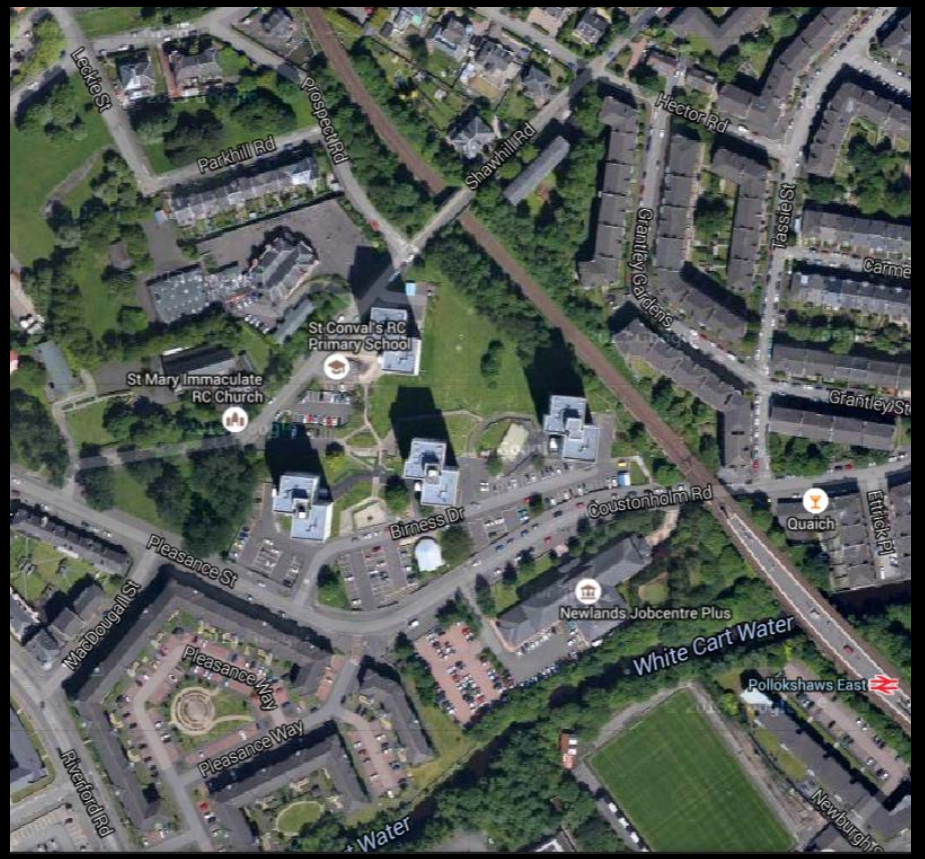
CAPI survey

4 disadvantaged urban communities in Scotland (Edinburgh and Dundee)

Residents > 16 years

June 2010

N = 406



Measures

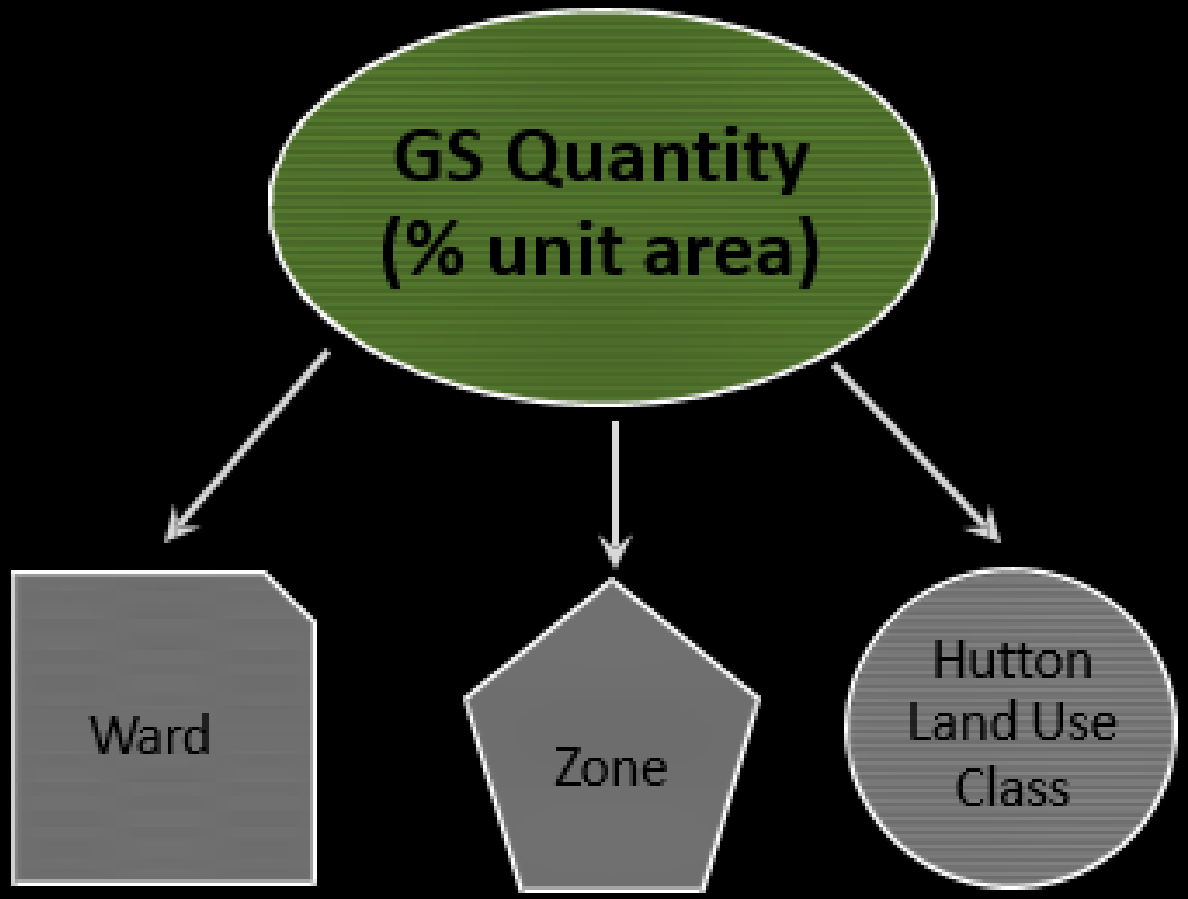
Health and Wellbeing

- **Perceived Stress Scale, PSS (Cohen & Williamson, 1988)**
- **Mental wellbeing, SWEMWBS (Steward-Brown et al., 2009)**
- Physical activity
- General Health
- Life Satisfaction

Green space: **objective** + subjective

- **quantity**
- quality
- accessibility
- usage

Measures: Green space quantity

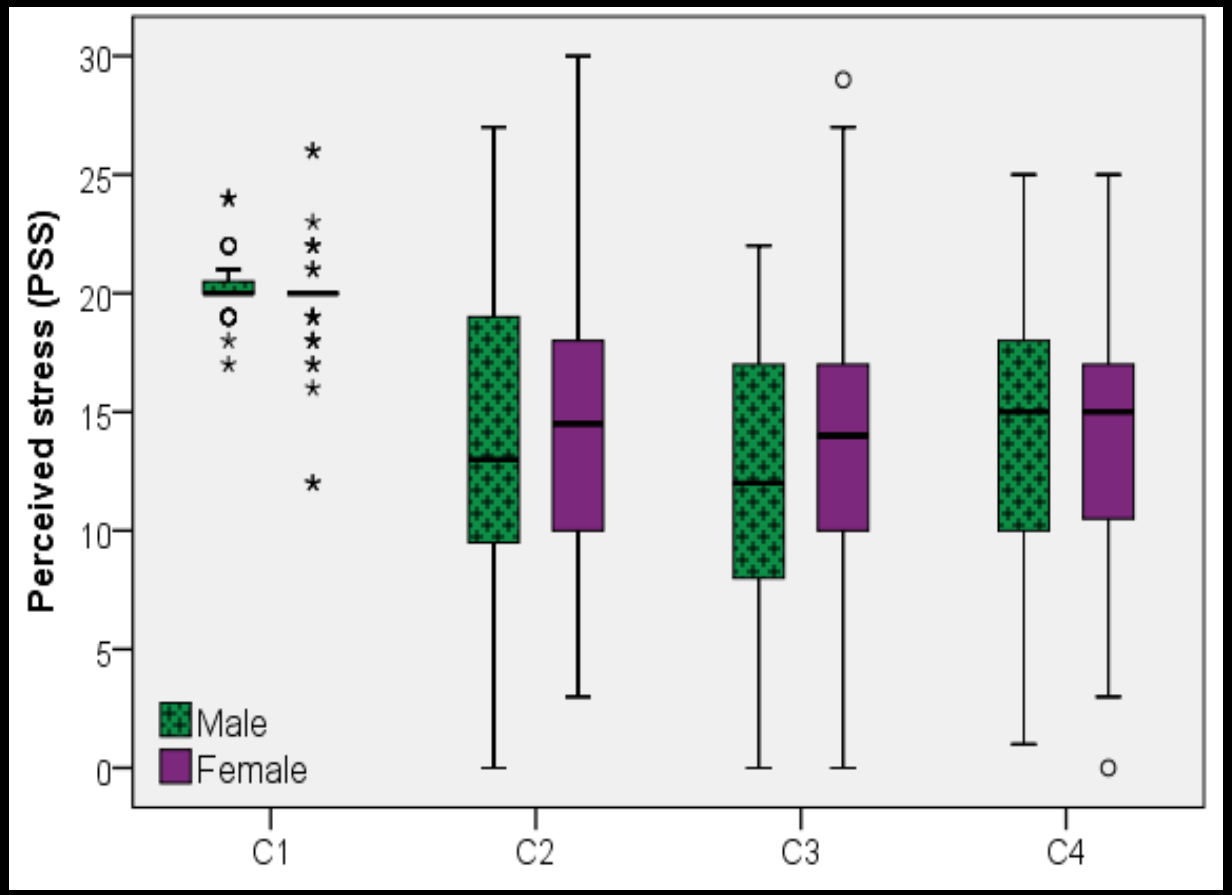


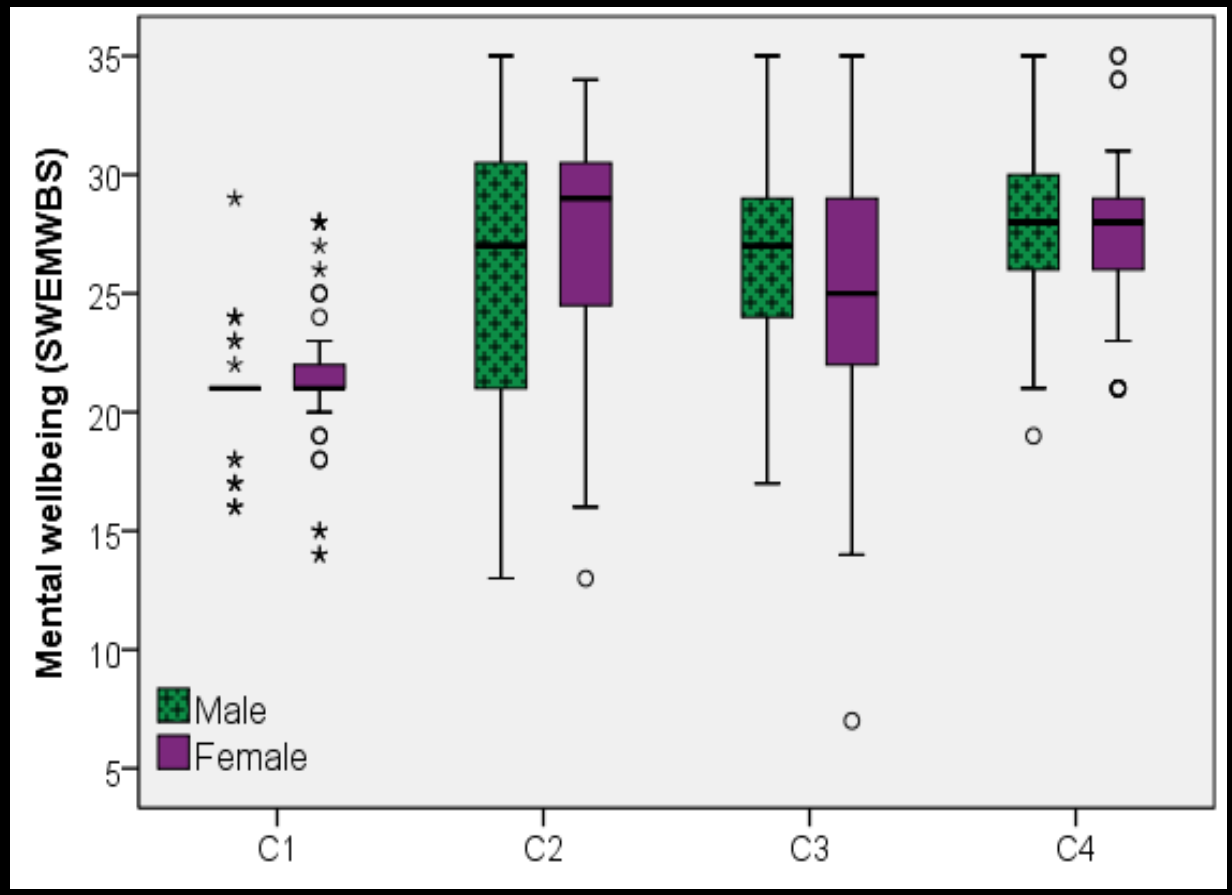
James Hutton Institute
'Land Use Class'(S Gov PAN65)

Public open space, gardens + roadside trees and grass

300m buffer around the home

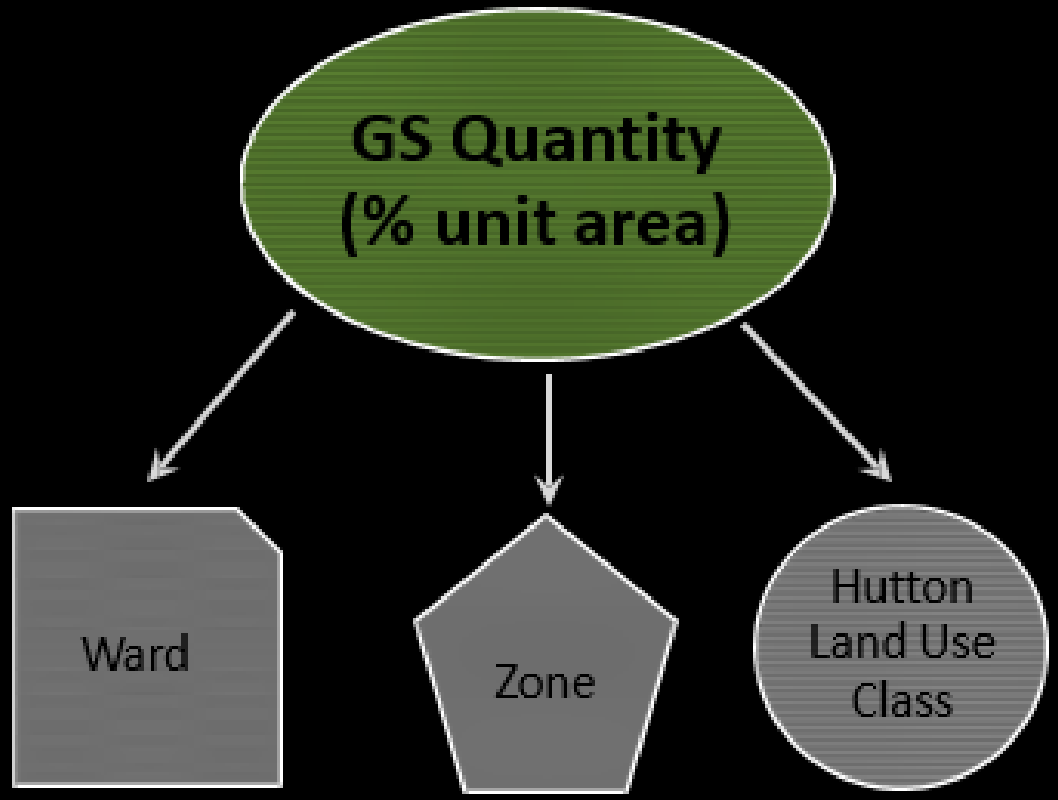
Study sample





3 communities: n = 305

Study sample



HLUC Green space quantity: n = 206

Analysis

Hierarchical Multiple Linear Regression (MLR)

- Block 1: Age, Income Coping, Deprivation (Carstairs Index), Employment, Education, Life partner, Children
- Block 2: Physical activity
- Block 3: Green space quantity

+ Moderation by Gender

Regression analyses

1. **Study sample** (n = 206)

2. Individuals not in full time work: '***Subgroup A***' (n = 147)

3. Individuals most likely to spend a greater proportion of their time at home, based on work status: '***Subgroup B***' (n = 68)

    (i) looking after the home/family
    (ii) retired
    (iii) long term sick and disabled

Regression analyses

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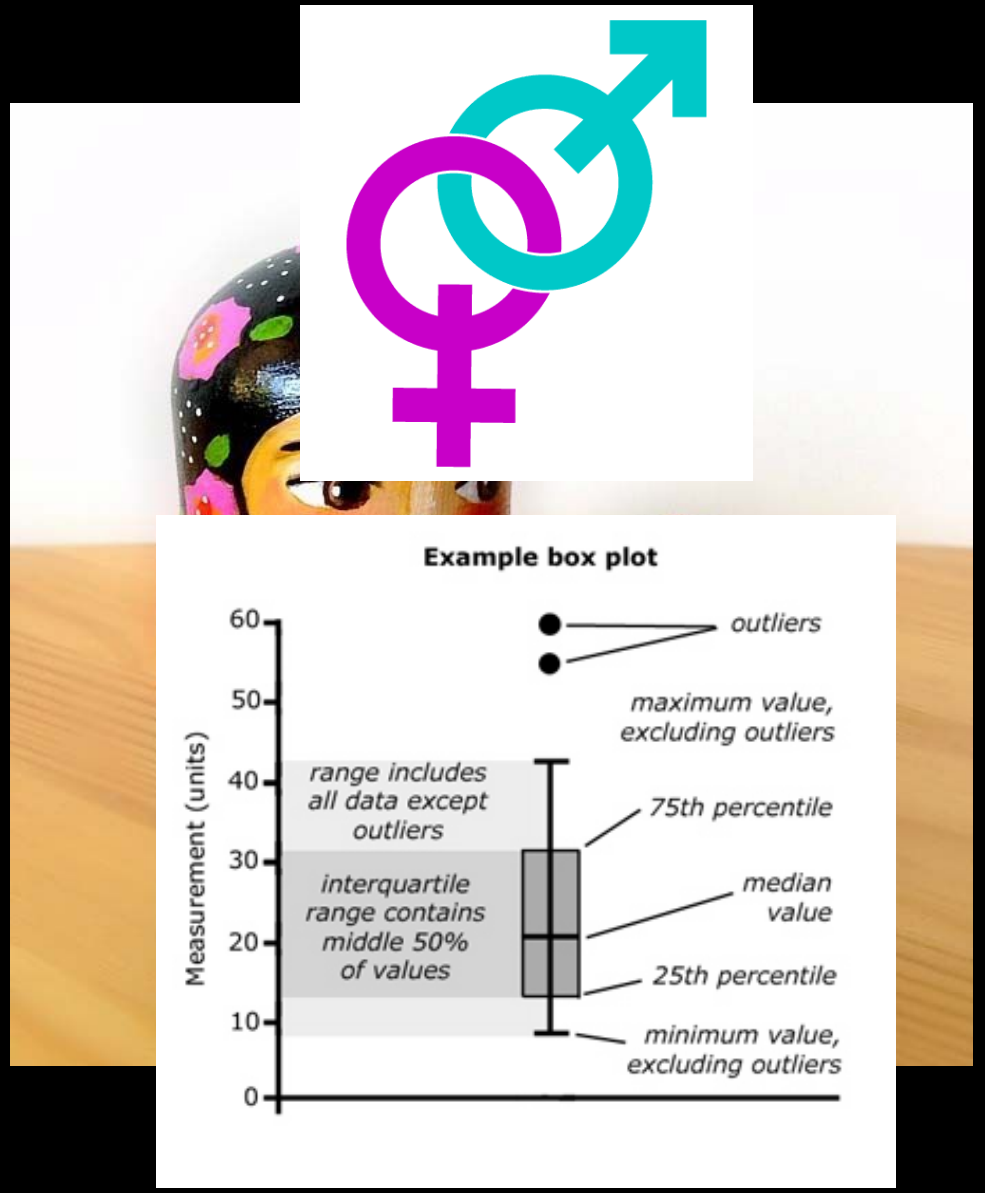


Regression analyses

(1) Study sample

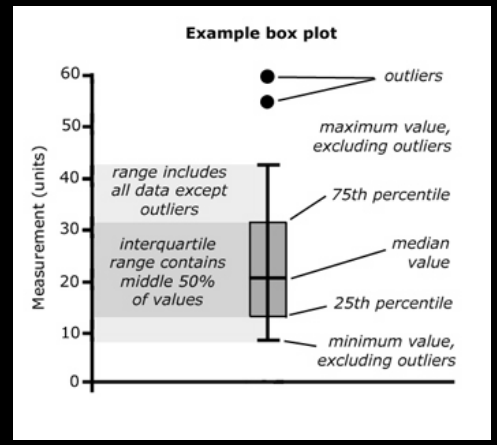
(2) Subgroup A: ‘Not in full time work’

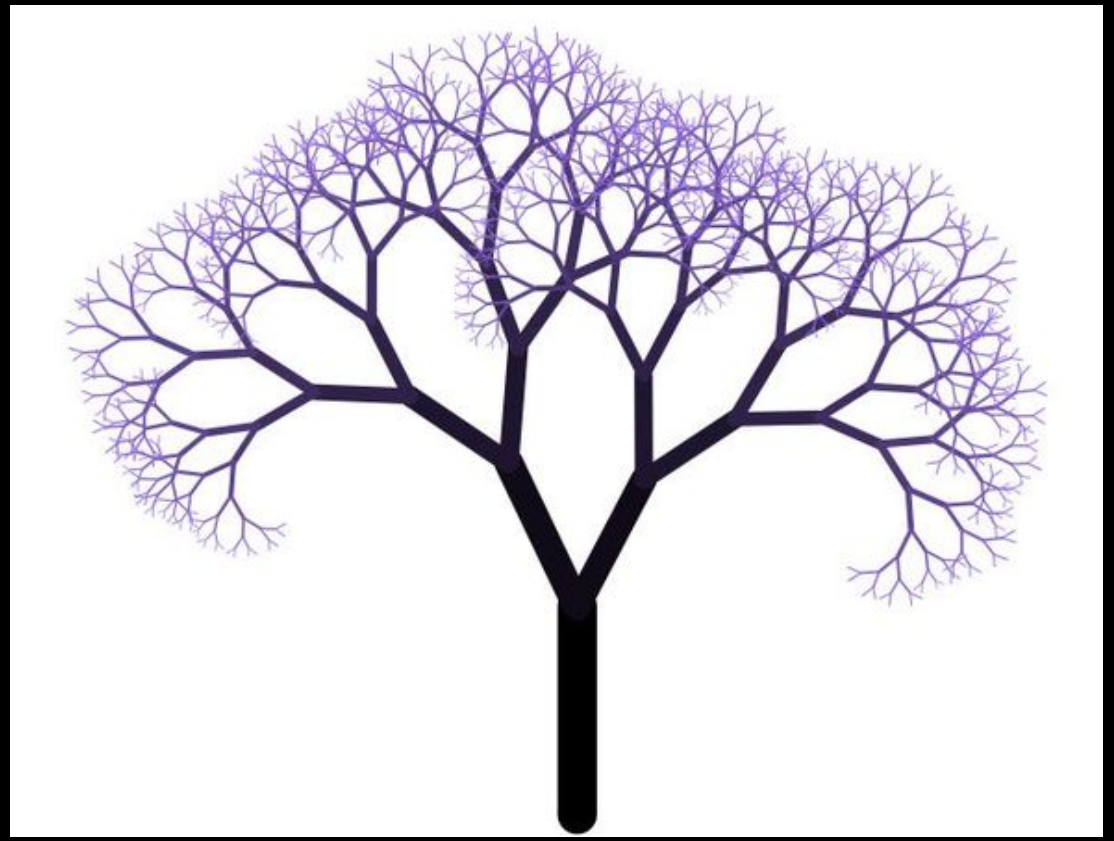
(3) Subgroup B ‘At home most’

By Gender (+ M&F combined)

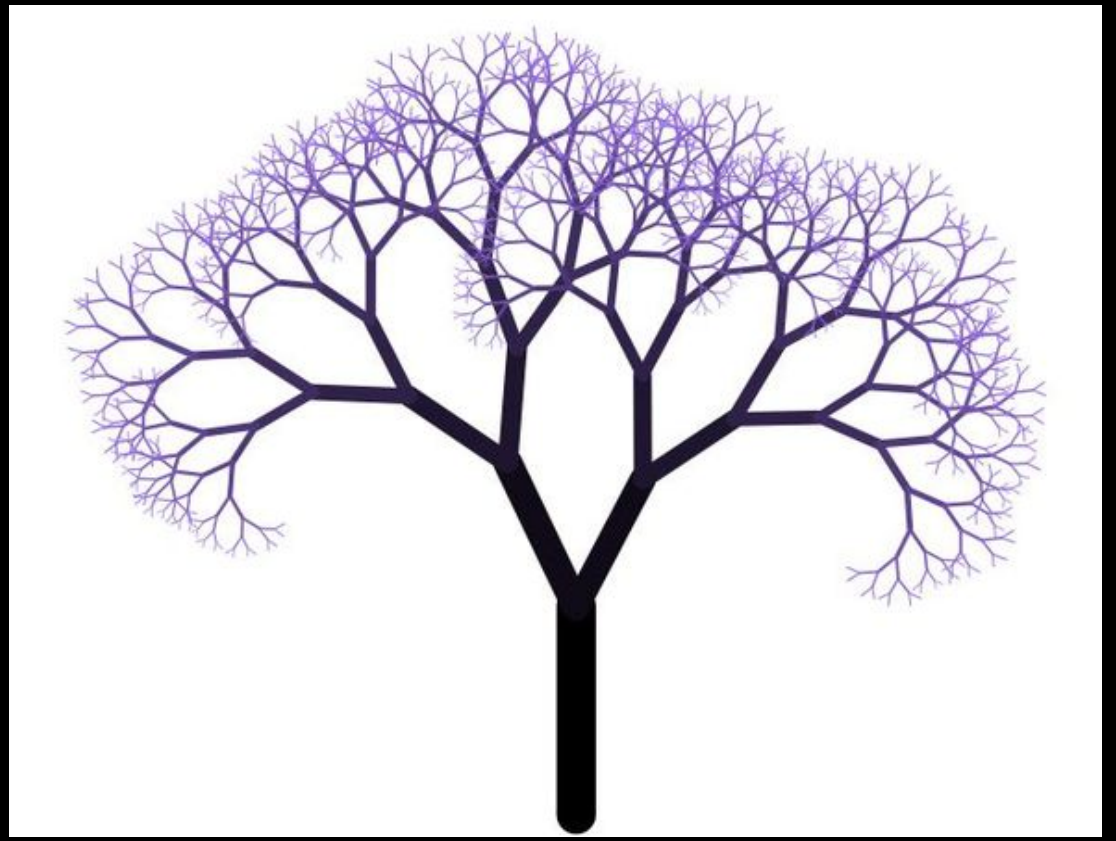
Exceptional adverse life conditions ‘EALC’ filter

(sample screened of (i) ***outliers*** *+ (ii) all individuals reporting a* ***sig. negative impact of recent life event****)*





Perceived stress (PSS)



Mental wellbeing (SWEMWBS)

GS Quantity
(% unit area)

Ward

Zone

Hutton
Land Use
Class

GS Quantity
(% unit area)

Ward

Zone

Hutton
Land Use
Class

Results

Sample characteristics

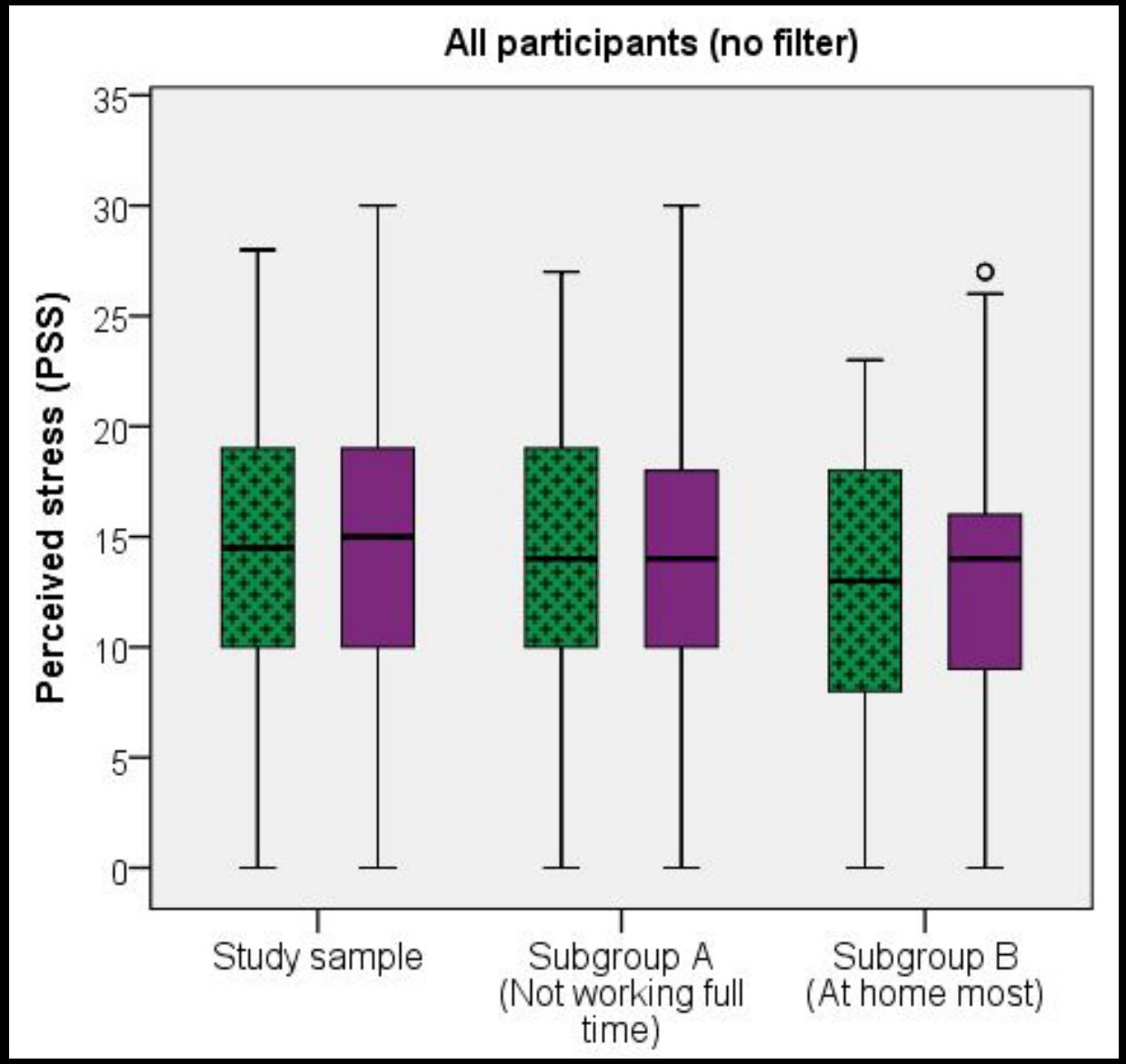
	Study sample			Subgroup A: Not in full time work (n = 147)		Subgroup B: At home most (n = 68)	
	All	Male	Female	Male	Female	Male	Female
n (%)	206 (100)	85 (41)	121 (59)	52 (35)	95 (65)	22 (32)	44 (65)
Age [n = 205]							
mean (SD)	44 (17)	46 (17)	43 (17)	50 (18)	44 (18)	65 (11)	51 (19)
min, max	16, 82	16, 82	16, 74	16, 82	16, 74	28, 82	17, 74
Work status (n,%)							
Working full-time	29	39	21				
Working part-time	16	4	25	6	32		
Job seeking	19	27	14	44	18		
In education (full or part-time)	2	2	2	4	3		
Looking after home/family	9	0	15	0	19	0	41
Sick or disabled	4	6	3	9	4	23	9
Retired	19	20	18	33	23	77	50
Unknown	2	2	<1	4	1		

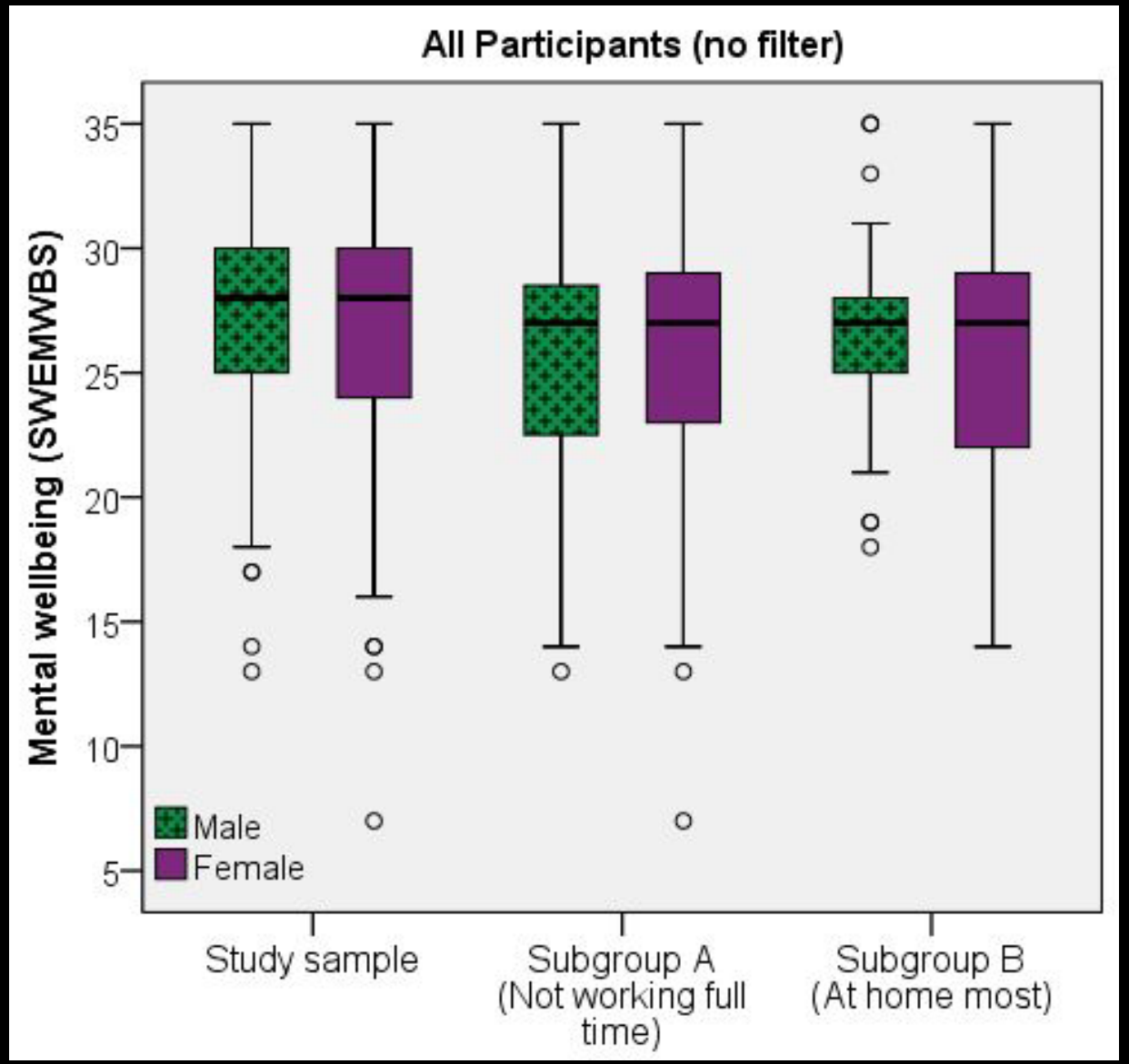
Ethnicity:

White
Scottish 96%

Other UK 1.6%

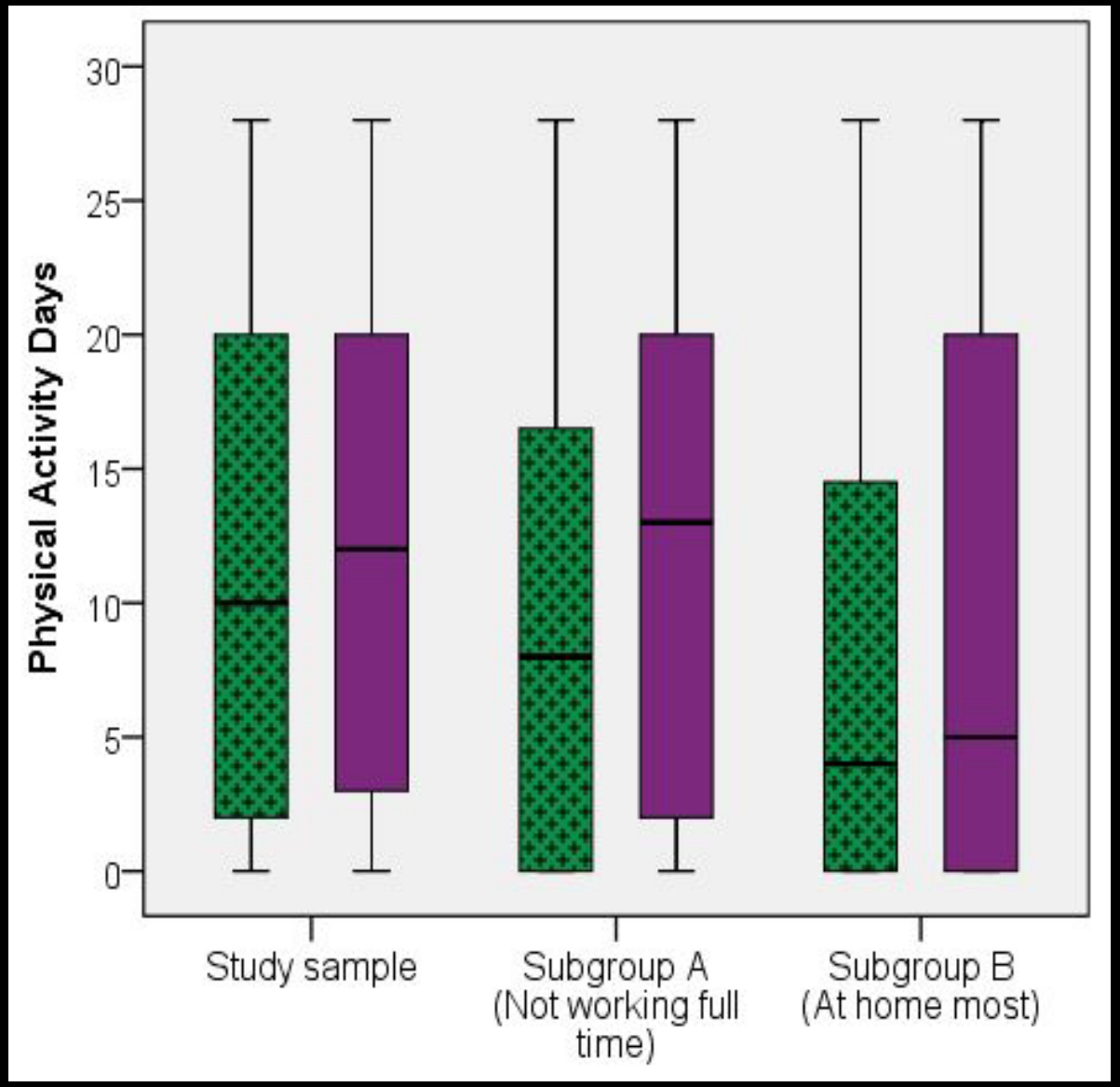
Non-UK 2.3%

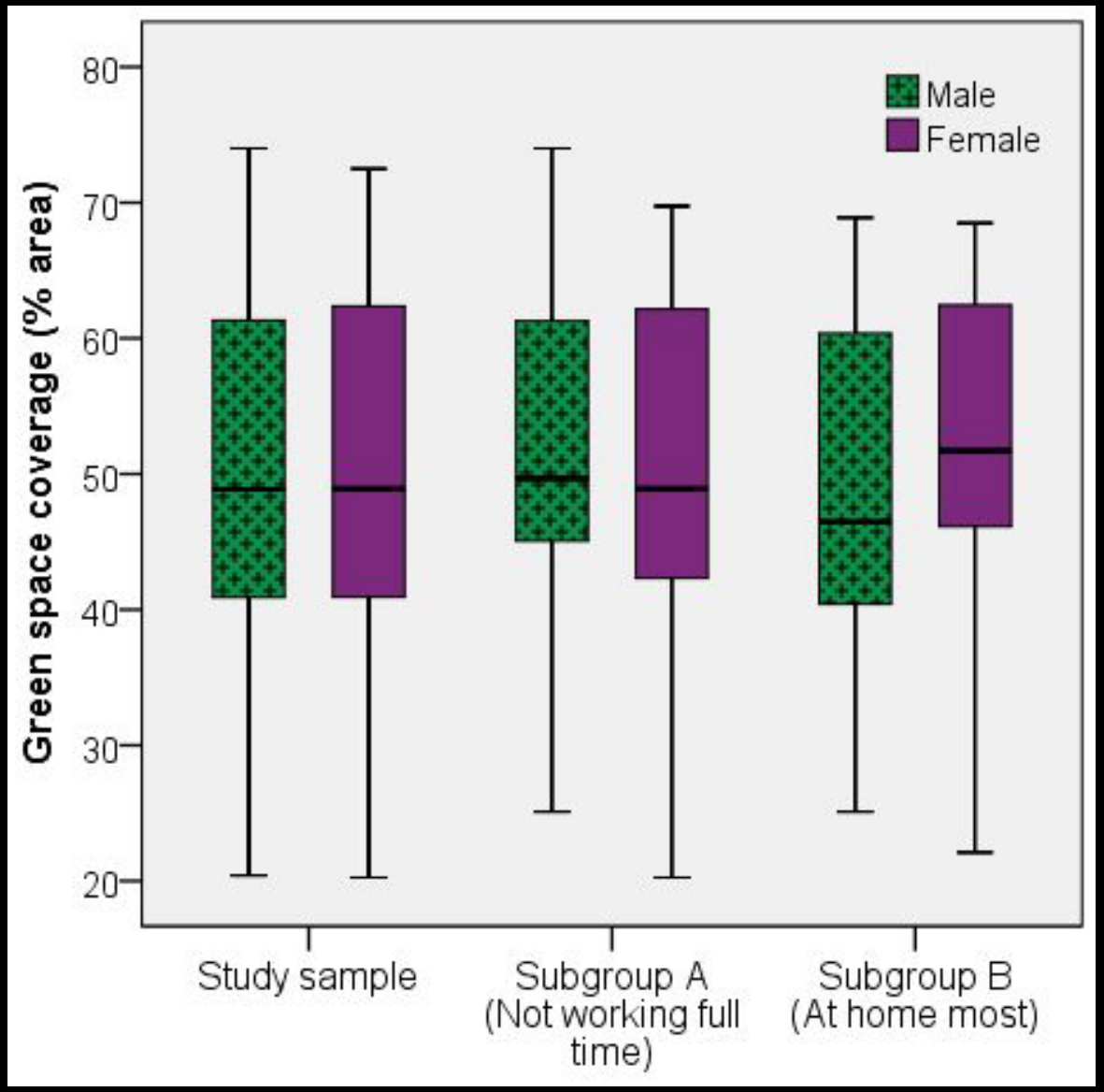




Perceived stress (PSS): mean = 13.9 (SD = 6.3), males = 13.1, females = 14.4

Mental wellbeing (SWEMWBS): median = 28 (IQR = 5), males = 28, females = 27

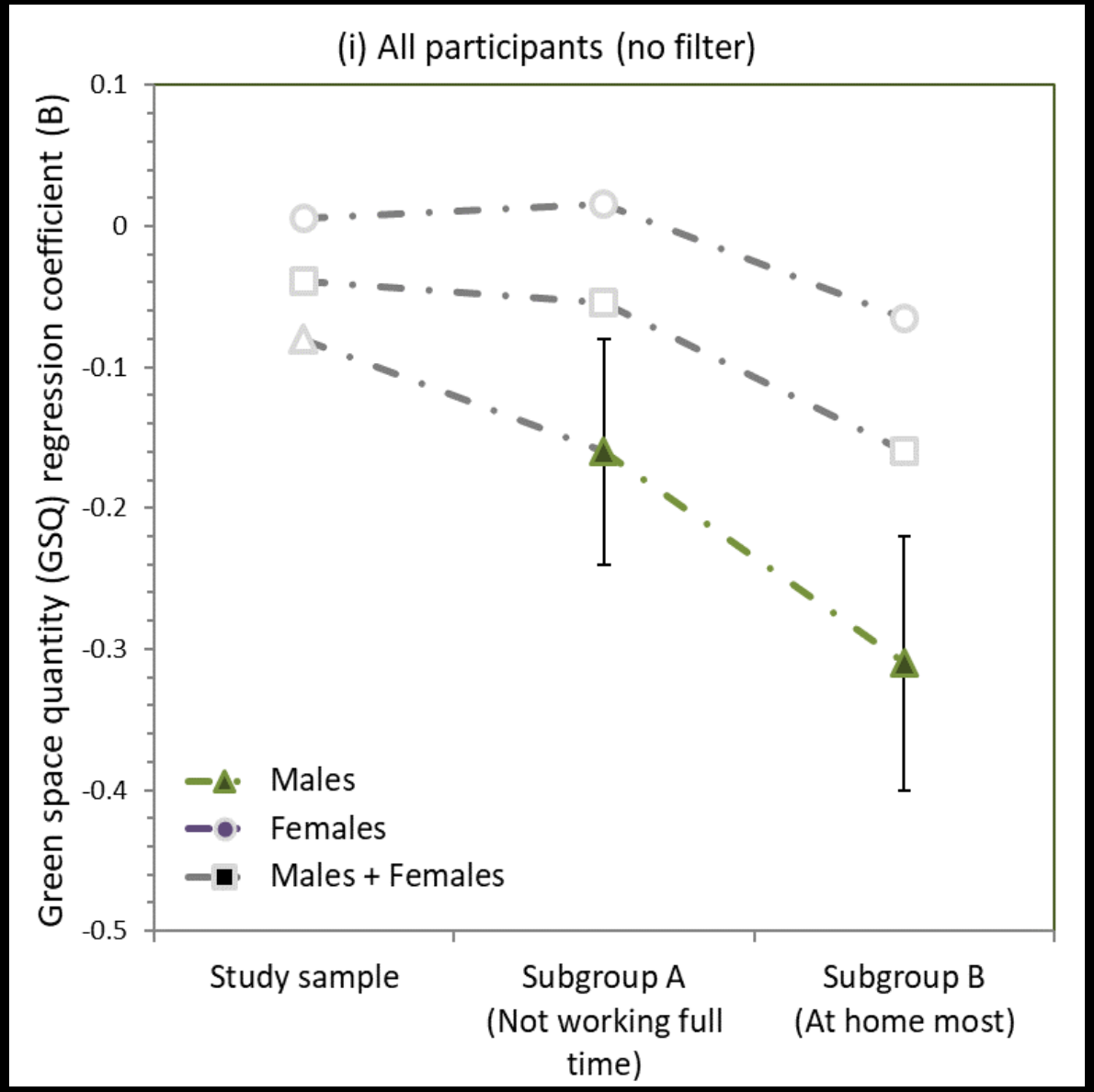


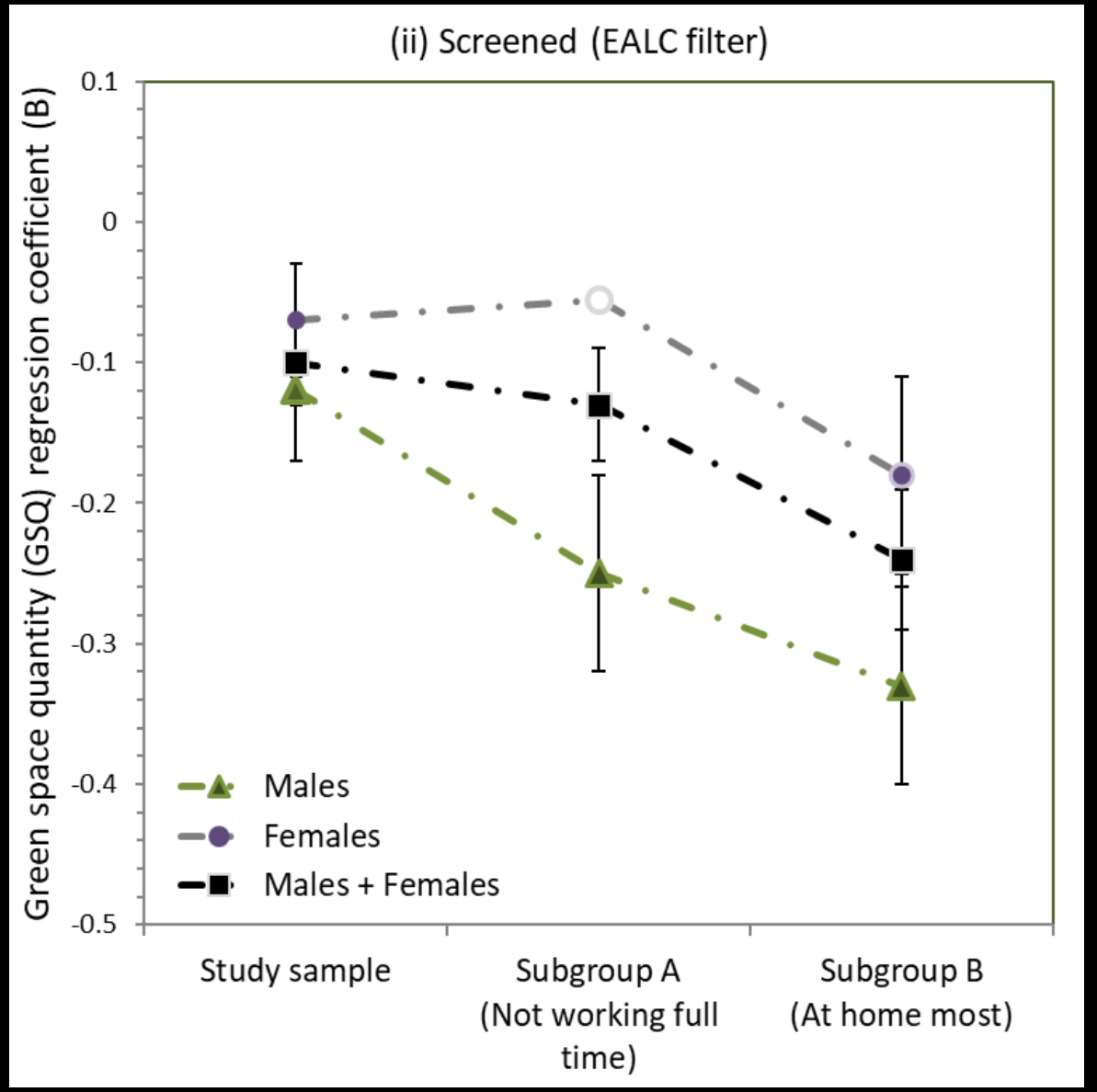


Physical activity: median = 14 (IQR = 15), males = 12, females = 15

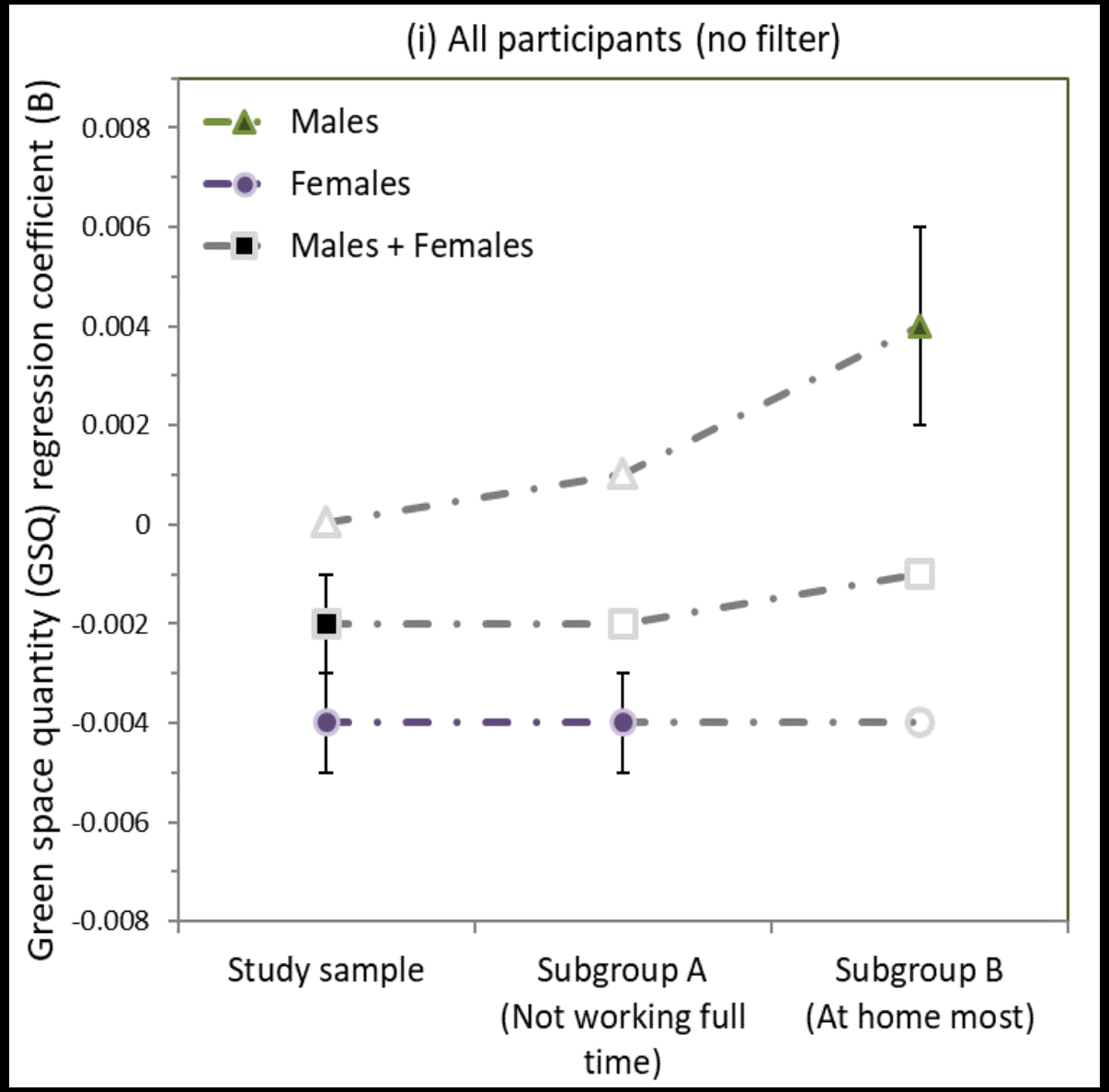
Green space quantity mean = 50% (SD = 14), males = 50%, females = 50%

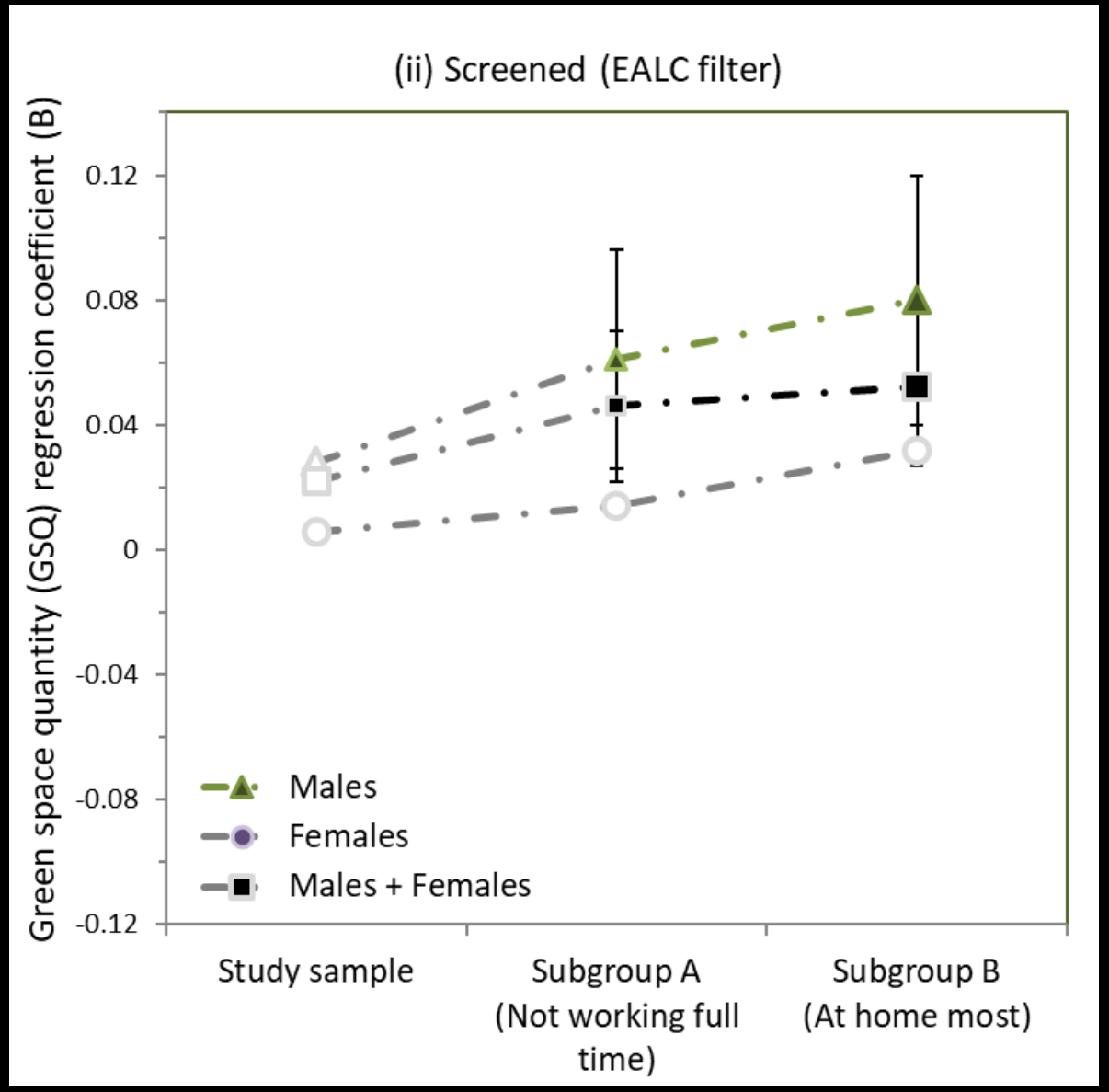
Perceived stress scale (PSS) – green space quantity relationships





Mental wellbeing (SWEMWBS) – GSQ relationships





Gender differences in relationships

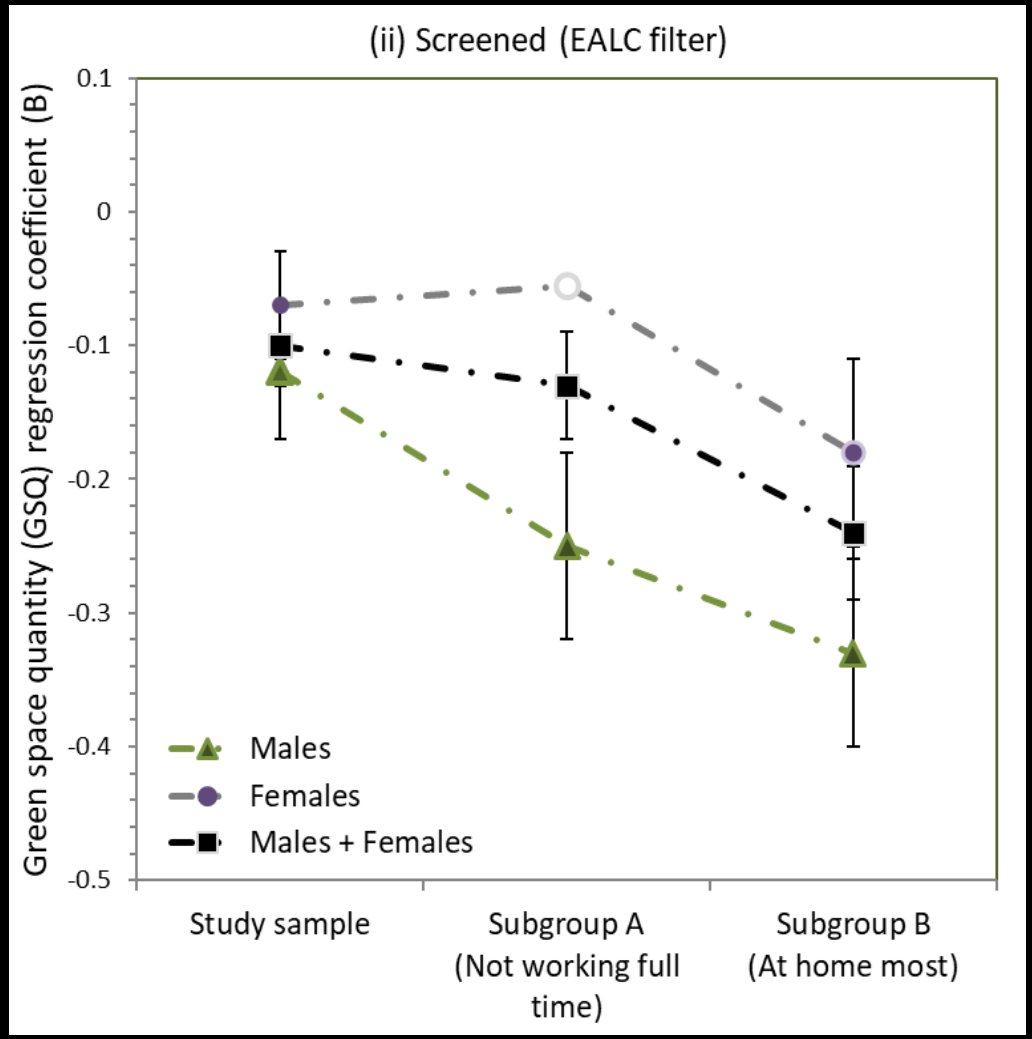
1. Distinct gender differences in relationships between GSQ and mental health outcomes
    - Consistently positive GSQ effect for MH for males
    - More complex for females (+ve and –ve effects)

2. Gender was not a significant moderator of PSS or SWEMWBS

Work status as a proxy for exposure

GSQ effect sizes increased in strength across analysis groups + strongest for Subgroup B ('At home most'), particularly for:

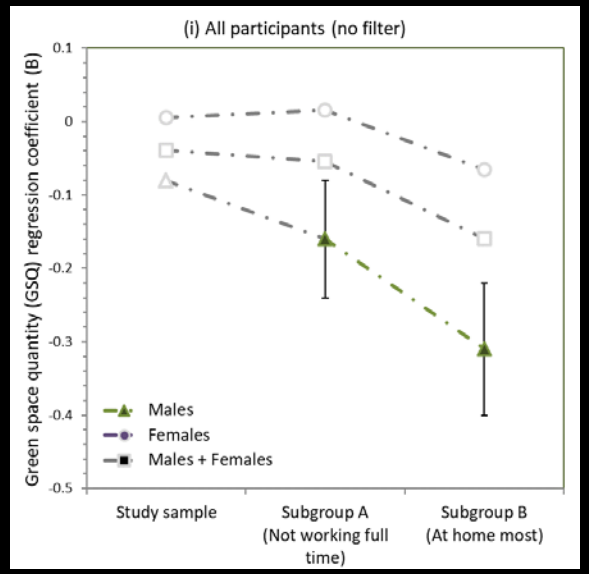
- Males
- Perceived stress

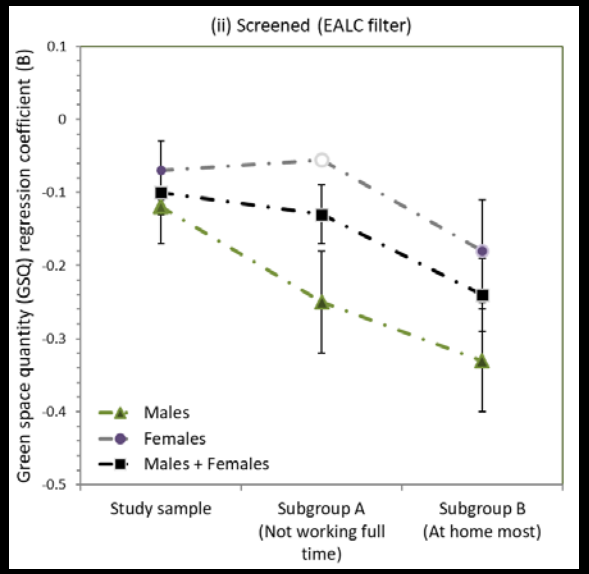


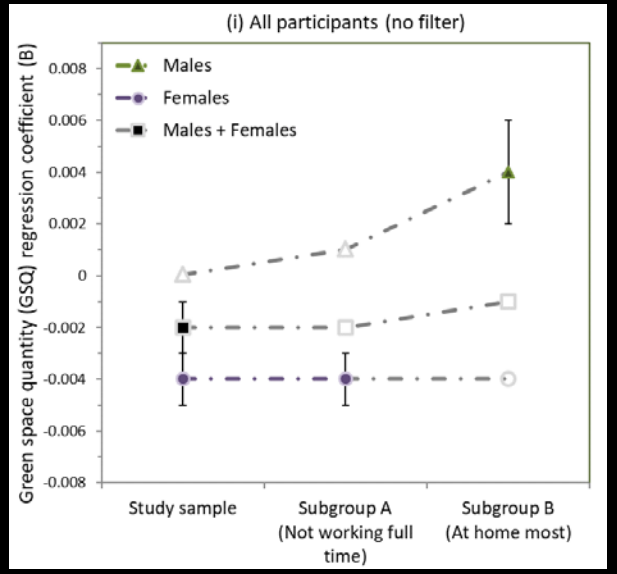
Screening the sample: ‘EALC’ filter

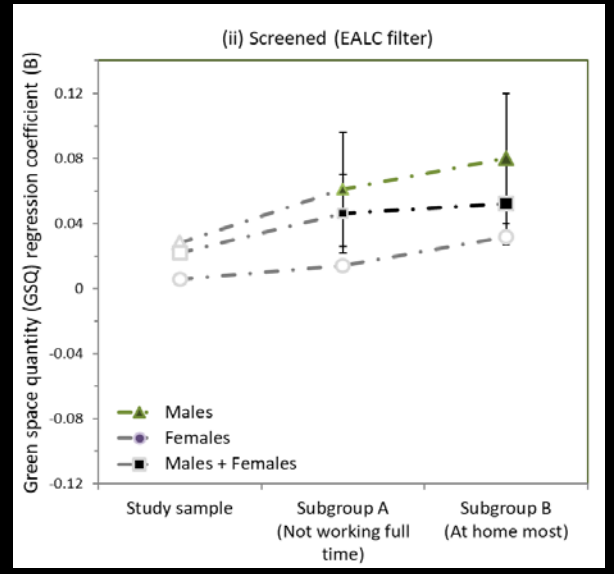
Resulted in:

- greater number of sig. green space quantity (GSQ) effects
- larger GSQ effects for males
- consistent pattern of results between males and females









Other observations

1. Findings broadly consistent between PSS and SWEMWBS

2. Green space quantity accounted for considerably more variance in PSS (3 – 52%) compared to SWEMWBS (3-12%)

3. Physical activity was not a significant predictor of PSS, but was a significant predictor of SWEMWBS (up to 26% variance for males, 8% for females)

Discussion

Discussion

Comparison with other studies: any overall pattern?

Green space metric		Heath outcome	Green space effect / re		
			Direction: Better health with more GS?		
			Males	Females	M+F
Quantity / relative amount (%)	300 m buffer	PSS	x	x	x
		PSS, EALC filter	+	+	+
	300 m buffer, Subgroup B	PSS	+	x	x
		PSS, EALC filter	+	+	+
	300 m buffer	SWEMWBS	x	-	-
		SWEMWBS, EALC filter	x	x	x
	300 m buffer, Subgroup B	SWEMWBS	+	x	x
		SWEMWBS, EALC filter	+	x	+
Quantity / relative amount (%)	UK CAS Ward, binary (43%)	Perceived stress (PSS)	+	+	
	UK CAS Ward, binary 'low' GS group only	Cortisol mean and slope	x	+	
Quantity ('')		GHQ-12???? 'Perceived risk of poc	+	+	
Quantity ('')	1km buffer	DASS (Depression Anxiety Stress S	x	x	
	3km buffer	DASS	-	+	
Quantity ('')	UK CAS Ward	GHQ-12 (Mental distress)	+	x (u)	
Proximity (distance)	X (300 m ?) to park, freq users only ()	Depressive symptoms	x	-	
Access (physical and	IS THIS REALLY ACCESS ?	Perceived stress (LS-test)	+	x	
Freq visits		Mental health and vitality (SF-6)	+	+	
Quantity / relative an	UK CAS Ward	Cardiovascular mortality	+	x	
		Respiratory disease mortality	+	x	

Discussion

Comparison with other studies: any overall pattern? **Maybe...**

Methodology recommendations

- routinely stratify analyses by gender
- account for exposure
- screen sample...
- PSS and physical activity
- ++++

Limitations

Work status proxy: crude assumptions around time at home + notable differences in some variables imp. for mental health across analysis subgroups e.g. age, physical activity *(but...)*

Assumes uniform quality of green space *(but limited variation expec.)*

Assumes binary gender *(but sample is small)*

Cross-sectional study – selection effects *(but disadvantaged communities only)*

Conclusions

Conclusions

Relationships between amount of green space in the environment and mental health can differ significantly by gender, in both direction and/or magnitude

Effect sizes for residential green space based on whole study populations may substantially underestimate for gender and other subgroups, such as those with a greater level of exposure (e.g. older people, children)

Conclusions

Work status may serve as a crude but useful proxy for exposure to neighbourhood green space

Methodological handling of data (e.g. treatment of outliers and exceptional cases) can have a significant impact on results and their interpretation

Further research is needed to confirm findings - use existing datasets

James Hutton: http://www.hutton.ac.uk/research/projects/green-health

OPENspace: http://www.openspace.eca.ed.ac.uk/research-projects/greenhealth

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THE GLASGOW SCHOOL OF ART

SGIF
Scottish Green Infrastructure Forum
www.sgif.org.uk

ISUH
International Society for Urban Health

Health Equity: The New Urban Agenda and Sustainable Development Goals

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