

# **Changing levels of local crime and mental health: A natural experiment utilising self-reported and service use data in Scotland**

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## **Supplementary Materials**

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Supplementary Table 6: Sensitivity analysis presenting main findings after excluding participants with psychiatric inpatient service use in 2001/09 and psychotropic medications in 2009.

**Supplementary Table 1: Description of the covariates.<sup>a</sup>**

<b>Variable</b>	<b>Description</b>
Sex in 2001	Male, Female
Age in 2001	Derived from the date of birth question
Ethnicity in 2001	
White	White Scottish, Other White British, White Irish, Other White
Non-white	Any Mixed Background, Indian, Pakistani, Bangladeshi, Other South Asian, Caribbean, African, Black Scottish or Other Black, Chinese, Other Ethnic Group
Educational attainment 2001/2011	
No qualification	No professional, vocational or academic qualifications
Level 1	O Grade, Standard Grade, Access 3 Cluster, Intermediate 1 or 2, GCSE, CSE, Senior Certificate or equivalent; GSVQ Foundation or Intermediate, SVQ level 1 or 2, SCOTVEC Module, City and Guilds Craft or equivalent; Other school qualifications not already mentioned (including foreign qualifications)
Level 2	SCE Higher Grade, Higher, Advanced Higher, CSYS, A Level, AS Level, Advanced Senior Certificate or equivalent; GSVQ Advanced, SVQ level 3, ONC, OND, SCOTVEC National Diploma, City and Guilds Advanced Craft or equivalent
Level 3	HNC, HND, SVQ level 4 or equivalent; Other post-school but pre-Higher Education qualifications not already mentioned (including foreign qualifications)
Level 4	Degree, Postgraduate qualifications, Masters, PhD, SVQ level 5 or equivalent; Professional qualifications (for example, teaching, nursing, accountancy); Other Higher Education qualifications not already mentioned (including foreign qualifications)
Social class based on occupation 2001	
I/II	Professional, managerial and technical occupations
IIIN	Skilled non-manual occupations
IIIM	Skilled manual occupations
IV	Partly skilled occupations
V	Unskilled occupations
Other	Non-resident students and people who never worked
Social grade in 2011 <sup>b</sup>	
AB	Higher or intermediate managerial, administrative or professional
C1	Supervisory, clerical and junior managerial, administrative and professional
C2	Skilled manual workers
D	Semi-skilled and unskilled manual workers
E	State pensioners, casual and lowest grade workers, unemployed with state benefits only
Employment status 2001/2011	
In employment	Economically active: In employment (part-time, full-time)
Retired	Economically inactive: Retired
Out of labour force	Economically inactive: Student; Looking after home or family; Long-term sick or disabled; Other
Unemployed	Economically active: Unemployed (Seeking work and available to start in 2 weeks or waiting to start a job already obtained)
Marital status in 2001/2011	
Married	Married; In a registered same-sex civil partnership
Single	Never married and never registered a same-sex civil partnership
Separated	Separated, but still legally married; Separated, but still legally in a same-sex civil partnership

Divorced	Divorced; Formerly in a same-sex civil partnership which is now legally dissolved
Widowed	Widowed; Surviving partner from a same-sex civil partnership
Living status in 2001/2011	
Alone	One Person Household
With others	Other Households
Long-term illness in 2001	
Yes	Has a long-term illness, health problem or disability which limits daily activities or work (including problems which are due to old age)
No	Does not a long-term illness, health problem or disability which limits daily activities or work (including problems which are due to old age)

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<sup>a</sup> Source: <https://sls.lscs.ac.uk/variables>

<sup>b</sup> <http://www.nrs.co.uk/nrs-print/lifestyle-and-classification-data/social-grade/>

**Supplementary Table 2:** Sample size and percentage of individuals with mental health problems by age and moving status.

	<b>Total sample</b> (n=112 251)		<b>Stayers</b> (n=80 958)		<b>Past movers<sup>a</sup></b> (n=15 940)		<b>Recent movers<sup>b</sup></b> (n=15 353)	
	n	% of cases	n	% of cases	n	% of cases	n	% of cases
<b>Self-reported mental-health</b>								
16-30 years old	30000 <sup>c</sup>	5	15000 <sup>c</sup>	5	7000 <sup>c</sup>	5	8000 <sup>c</sup>	7
31-45 years old	45000 <sup>c</sup>	6	34000 <sup>c</sup>	5	6000 <sup>c</sup>	6	5000 <sup>c</sup>	9
46-60 years old	37000 <sup>c</sup>	4	32000 <sup>c</sup>	4	3000 <sup>c</sup>	5	2000 <sup>c</sup>	6
<b>Antidepressant prescriptions</b>								
16-30 years old	30000 <sup>c</sup>	12	15000 <sup>c</sup>	12	7000 <sup>c</sup>	12	8000 <sup>c</sup>	13
31-45 years old	45000 <sup>c</sup>	15	34000 <sup>c</sup>	14	6000 <sup>c</sup>	16	5000 <sup>c</sup>	21
46-60 years old	37000 <sup>c</sup>	15	32000 <sup>c</sup>	15	3000 <sup>c</sup>	19	2000 <sup>c</sup>	20
<b>Antipsychotic prescriptions</b>								
16-30 years old	30000 <sup>c</sup>	1	15000 <sup>c</sup>	1	7000 <sup>c</sup>	1	8000 <sup>c</sup>	1
31-45 years old	45000 <sup>c</sup>	1	34000 <sup>c</sup>	1	6000 <sup>c</sup>	1	5000 <sup>c</sup>	3
46-60 years old	37000 <sup>c</sup>	1	32000 <sup>c</sup>	1	3000 <sup>c</sup>	1	2000 <sup>c</sup>	2

Source: Scottish Longitudinal Study.

Note: Age cohorts relate to age in 2001.

<sup>a</sup> Main residential location changed between 2004/06 and 2007/09.

<sup>b</sup> Main residential location changed between 2007/09 and 2010/12.

<sup>c</sup> Numbers are rounded to avoid risk of disclosure.

**Supplementary Table 3:** Average crime exposure and change in crime by age and moving status (crime per 1000 population).

	Total sample (n=112 251)		Stayers (n=80 958)		Past movers <sup>a</sup> (n=15 940)		Recent movers <sup>b</sup> (n=15 353)	
	Average crime exposure (SD)	Change in crime exposure (2007/09-2010/12)	Average crime exposure (SD)	Change in crime exposure (2007/09-2010/12)	Average crime exposure (SD)	Change in crime exposure (2004/06-2007/09)	Average crime exposure (SD)	Change in crime exposure (2007/09-2010/12)
16-30 years old	49.2 (53.2)	-8.3 (34.4)	46.8 (57.5)	-6.8 (17.3)	49.6 (47.6)	-10.1 (64.1)	53.3 (49.4)	-10.3 (55.0)
31-45 years old	42.8 (45.5)	-6.6 (22.6)	41.4 (45.6)	-6.1 (15.1)	45.3 (42.6)	-8.2 (50.8)	49.4 (47.1)	-8.7 (47.3)
46-60 years old	41.9 (43.4)	-6.1 (19.3)	41.1 (43.5)	-6.0 (14.4)	45.4 (39.9)	-7.1 (47.8)	48.6 (44.0)	-7.0 (48.4)
All ages	44.2 (47.1)	-6.9 (25.5)	42.3 (47.3)	-6.2 (15.3)	47.3 (44.6)	-9.0 (57.0)	51.3 (47.9)	-9.3 (51.6)

Source: Scottish Longitudinal Study.

Note: Age cohorts relate to age in 2001. SD, Standard deviation.

<sup>a</sup> Main residential location changed between 2004/06 and 2007/09.

<sup>b</sup> Main residential location changed between 2007/09 and 2010/12.

**Supplementary Table 4:** Sensitivity analysis presenting main findings further adjusted for data zone-level average income deprivation and change in income deprivation.

	Total sample (n=112 251)		Stayers (n=80 958)		Past movers <sup>a</sup> (n=15 940)		Recent movers <sup>b</sup> (n=15 353)	
	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2010/12}$ )	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2010/12}$ )	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2004/06}$ )	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2010/12}$ )
<b>Self-reported mental-health</b>								
16-30 years old	<b>1.42 (1.08-1.87)</b>	1.01 (0.99-1.04)	<b>1.39 (1.00-1.94)</b>	1.08 (0.98-1.20)	1.20 (0.66-2.18)	1.01 (0.96-1.06)	1.39 (0.91-2.11)	1.00 (0.96-1.04)
31-45 years old	1.01 (0.84-1.23)	1.04 (0.99-1.08)	0.94 (0.74-1.20)	0.99 (0.90-1.09)	0.94 (0.53-1.68)	1.03 (0.96-1.11)	0.99 (0.59-1.66)	<i>1.06 (0.99-1.13)</i>
46-60 years old	1.11 (0.87-1.42)	0.98 (0.94-1.03)	1.09 (0.83-1.42)	0.96 (0.87-1.05)	1.11 (0.54-2.31)	1.02 (0.95-1.09)	0.55 (0.21-1.39)	0.99 (0.90-1.10)
All ages	1.12 (0.95-1.33)	1.02 (0.99-1.04)	1.07 (0.90-1.27)	1.00 (0.93-1.08)	1.08 (0.75-1.55)	1.01 (0.98-1.04)	1.07 (0.74-1.56)	1.02 (0.99-1.05)
<b>Antidepressant prescriptions</b>								
16-30 years old	1.03 (0.86-1.24)	1.01 (0.99-1.03)	1.07 (0.86-1.34)	<b>1.07 (1.02-1.12)</b>	0.90 (0.60-1.34)	1.01 (0.97-1.05)	0.91 (0.69-1.20)	0.99 (0.96-1.03)
31-45 years old	0.98 (0.87-1.10)	1.00 (0.96-1.03)	0.90 (0.77-1.06)	0.99 (0.92-1.05)	0.87 (0.65-1.17)	1.02 (0.98-1.05)	1.29 (0.86-1.93)	1.00 (0.96-1.03)
46-60 years old	1.05 (0.94-1.18)	0.98 (0.95-1.02)	1.06 (0.95-1.19)	0.97 (0.92-1.01)	1.00 (0.58-1.72)	0.96 (0.89-1.03)	<b>0.55 (0.34-0.89)</b>	1.00 (0.93-1.08)
All ages	1.02 (0.93-1.12)	1.00 (0.98-1.02)	1.00 (0.91-1.10)	0.99 (0.96-1.02)	0.92 (0.71-1.20)	1.00 (0.98-1.03)	0.94 (0.75-1.18)	0.99 (0.96-1.03)
<b>Antipsychotic prescriptions</b>								
16-30 years old	1.27 (0.78-2.05)	1.01 (0.92-1.11)	1.39 (0.67-2.87)	1.24 (0.89-1.74)	1.46 (0.47-4.54)	1.04 (0.98-1.10)	0.87 (0.37-2.07)	0.94 (0.88-1.02)
31-45 years old	1.15 (0.72-1.83)	<i>1.10 (1.00-1.21)</i>	1.02 (0.63-1.68)	1.03 (0.88-1.22)	0.75 (0.22-2.62)	1.04 (0.93-1.16)	1.95 (0.71-5.36)	<b>1.14 (1.03-1.26)</b>
46-60 years old	1.53 (1.04-2.26)	1.05 (0.96-1.15)	<b>1.80 (1.13-2.87)</b>	1.14 (0.95-1.37)	0.46 (0.10-2.10)	0.96 (0.83-1.10)	0.63 (0.16-2.45)	1.04 (0.89-1.22)
All ages	<b>1.27 (1.01-1.59)</b>	<b>1.05 (1.00-1.10)</b>	<b>1.37 (1.03-1.82)</b>	1.10 (0.98-1.24)	0.93 (0.47-1.86)	1.02 (0.95-1.09)	1.21 (0.64-2.28)	1.05 (0.98-1.12)

Source: Scottish Longitudinal Study.

Note: Age cohorts relate to age in 2001. Bold text indicates significant associations ( $p < 0.05$ ), italic trend-wise ( $p < 0.1$ ). Average crime exposure is log10-transformed, change in crime exposure is standardized. Models were fitted with logistic regression applying cluster robust estimation at local authority level; estimates are expressed in OR with 95% CI. All models included average and change variables at the same time, and were adjusted for sex, age (and age-squared in the non-stratified total sample), 2001 baseline covariates (ethnicity; education; social class; employment; marital status; living status; long-term illness), psychiatric inpatient service use in 2001/03, 2001 – 2011 change indicators (gained higher level of education; separated, divorced or widowed; started to live alone; became unemployed or left labour force) and social grade in 2011.

<sup>a</sup> Main residential location changed between 2004/06 and 2007/09.

<sup>b</sup> Main residential location changed between 2007/09 and 2010/12.

**Supplementary Table 5:** Sensitivity analysis presenting main findings among individuals who stayed at the same residential data zone during the entire study period.

	Stayers (n=71 000) <sup>a</sup>	
	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2010/12}$ )
<b>Self-reported mental-health</b>		
16-30 years old	<b>1.72 (1.29-2.30)</b>	<i>1.10 (0.99-1.22)</i>
31-45 years old	<b>1.29 (1.03-1.62)</b>	1.01 (0.91-1.11)
46-60 years old	<b>1.32 (1.07-1.63)</b>	0.95 (0.86-1.06)
All ages	<b>1.38 (1.20-1.59)</b>	1.01 (0.93-1.09)
<b>Antidepressant prescriptions</b>		
16-30 years old	<b>1.39 (1.15-1.66)</b>	<i>1.05 (0.99-1.12)</i>
31-45 years old	<b>1.18 (1.05-1.34)</b>	1.00 (0.93-1.08)
46-60 years old	<b>1.26 (1.15-1.38)</b>	0.97 (0.93-1.02)
All ages	<b>1.26 (1.17-1.35)</b>	1.00 (0.96-1.03)
<b>Antipsychotic prescriptions</b>		
16-30 years old	1.17 (0.71-1.92)	1.12 (0.75-1.66)
31-45 years old	1.13 (0.74-1.73)	1.07 (0.89-1.28)
46-60 years old	<b>1.45 (1.05-2.00)</b>	1.14 (0.96-1.34)
All ages	<b>1.28 (1.02-1.60)</b>	1.10 (0.98-1.25)

Source: Scottish Longitudinal Study.

Note: Age cohorts relate to age in 2001. Bold text indicates significant associations ( $p < 0.05$ ), italic trend-wise ( $p < 0.1$ ). Average crime exposure is log10-transformed, change in crime exposure is standardized. Models were fitted with logistic regression applying cluster robust estimation at local authority level; estimates are expressed in OR with 95% CI. All models included average and change variables at the same time, and were adjusted for sex, age (and age-squared in the non-stratified total sample), 2001 baseline covariates (ethnicity; education; social class; employment; marital status; living status; long-term illness), psychiatric inpatient service use in 2001/03, 2001 – 2011 change indicators (gained higher level of education; separated, divorced or widowed; started to live alone; became unemployed or left labour force) and social grade in 2011.

<sup>a</sup> Number is rounded to avoid risk of disclosure.

**Supplementary Table 6:** Sensitivity analysis presenting main findings after excluding participants with psychiatric inpatient service use in 2001/09 and psychotropic medications in 2009

	Total sample (n=93 000) <sup>a</sup>		Stayers		Past movers <sup>b</sup>		Recent movers <sup>c</sup>	
	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2010/12}$ )	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2010/12}$ )	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2004/06}$ )	Average crime exposure ( $\bar{x}$ )	Change in crime exposure ( $x_{\Delta 2010/12}$ )
<b>Self-reported mental-health</b>								
16-30 years old	<b>1.68 (1.28-2.21)</b>	1.03 (0.99-1.07)	<b>1.76 (1.16-2.68)</b>	1.08 (0.92-1.26)	1.48 (0.84-2.62)	<i>1.05 (1.00-1.11)</i>	1.54 (0.83-2.88)	1.02 (0.96-1.09)
31-45 years old	<b>1.84 (1.40-2.43)</b>	1.05 (0.98-1.12)	<b>1.77 (1.27-2.46)</b>	1.02 (0.83-1.25)	1.55 (0.79-3.05)	1.00 (0.94-1.06)	<i>1.87 (0.93-3.74)</i>	<i>1.08 (1.00-1.17)</i>
46-60 years old	<b>1.50 (1.05-2.14)</b>	0.99 (0.91-1.07)	1.34 (0.93-1.93)	0.90 (0.75-1.07)	1.25 (0.63-2.49)	1.06 (0.98-1.14)	2.47 (0.58-10.54)	1.01 (0.82-1.25)
All ages	<b>1.71 (1.44-2.04)</b>	1.03 (0.99-1.06)	<b>1.66 (1.33-2.07)</b>	1.00 (0.88-1.14)	<b>1.59 (1.09-2.30)</b>	<b>1.03 (1.00-1.06)</b>	<b>1.73 (1.08-2.78)</b>	<i>1.04 (0.99-1.08)</i>
<b>Antidepressant prescriptions</b>								
16-30 years old	<b>1.20 (1.02-1.41)</b>	1.03 (0.99-1.06)	<b>1.27 (1.01-1.60)</b>	<b>1.12 (1.04-1.21)</b>	1.26 (0.92-1.73)	1.01 (0.97-1.05)	1.00 (0.75-1.34)	1.02 (0.98-1.06)
31-45 years old	<b>1.22 (1.07-1.39)</b>	0.99 (0.95-1.03)	<i>1.16 (0.99-1.35)</i>	0.99 (0.87-1.13)	1.29 (0.91-1.83)	0.97 (0.94-1.01)	<b>1.53 (1.04-2.25)</b>	1.00 (0.96-1.04)
46-60 years old	<i>1.19 (0.99-1.41)</i>	0.98 (0.91-1.07)	<b>1.26 (1.04-1.54)</b>	1.01 (0.91-1.11)	0.85 (0.51-1.42)	<b>0.92 (0.85-1.00)</b>	0.64 (0.31-1.34)	0.99 (0.87-1.12)
All ages	<b>1.22 (1.12-1.34)</b>	1.01 (0.98-1.03)	<b>1.24 (1.14-1.35)</b>	1.03 (0.96-1.10)	<b>1.21 (1.00-1.46)</b>	<i>0.98 (0.96-1.00)</i>	1.09 (0.85-1.39)	1.01 (0.97-1.04)
<b>Antipsychotic prescriptions</b>								
16-30 years old	<b>3.26 (1.03-10.27)</b>	0.97 (0.85-1.11)	<b>4.55 (1.31-15.88)</b>	<b>1.59 (1.07-2.37)</b>	d	d	d	d
31-45 years old	<b>2.16 (1.04-4.47)</b>	1.03 (0.86-1.23)	1.58 (0.60-4.16)	0.94 (0.77-1.15)	d	d	d	d
46-60 years old	1.34 (0.29-6.18)	0.81 (0.60-1.07)	1.15 (0.20-6.65)	0.94 (0.37-2.41)	d	d	d	d
All ages	<b>2.33 (1.22-4.44)</b>	0.96 (0.91-1.02)	2.07 (0.84-5.07)	1.05 (0.72-1.53)	d	d	d	d

Source: Scottish Longitudinal Study.

Note: Age cohorts relate to age in 2001. Bold text indicates significant associations ( $p < 0.05$ ), italic trend-wise ( $p < 0.1$ ). Average crime exposure is log10-transformed, change in crime exposure is standardized. Models were fitted with Poisson regression applying cluster robust estimation at local authority level; estimates are expressed in IRR with 95% CI. All models included average and change variables at the same time, and were adjusted for sex, age (and age-squared in the non-stratified total sample), 2001 baseline covariates (ethnicity; education; social class; employment; marital status; living status; long-term illness), psychiatric inpatient service use in 2001/03, 2001 – 2011 change indicators (gained higher level of education; separated, divorced or widowed; started to live alone; became unemployed or left labour force) and social grade in 2011.

<sup>a</sup> Number is rounded to avoid risk of disclosure.

<sup>b</sup> Main residential location changed between 2004/06 and 2007/09.

<sup>c</sup> Main residential location changed between 2007/09 and 2010/12.

<sup>d</sup> Could not be estimated because of the very low number of cases.