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RESEARCH ARTICLE

Neighborhood Crime and Psychotropic Medications: A Longitudinal Data Linkage Study of 130,000 Scottish Adults

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Introduction: Although neighborhood crime has been associated with mental health problems, longitudinal research utilizing objective measures of small-area crime and mental health service use is lacking. This study examines how local crime is associated with newly prescribed psychotropic medications in a large longitudinal sample of Scottish adults and explores whether the relationships vary between sociodemographic groups.

Methods: Data from the Scottish Longitudinal Study, a 5.3% representative sample of the population, were linked with police-recorded crime in 2011 for residential locality and with psychotropic medications from 2009 to 2014, extracted from the prescription data set of National Health Service Scotland. Individuals receiving medication during the first 6 months of observation were excluded; the remaining sample was followed for 5.5 years. Covariate-adjusted, multilevel mixed-effects logistic models estimated associations between area crime and prescriptions for antidepressants, antipsychotics, and anxiolytics (analyzed in 2018–2019).

Results: After adjustment for individual and neighborhood covariates, findings on 129,945 adults indicated elevated risk of antidepressant (OR=1.05, 95% CI=1.00, 1.10) and antipsychotic (OR=1.20, 95% CI=1.03, 1.39), but not anxiolytic (OR=0.99, 95% CI=0.93, 1.05) medication in high-crime areas. Crime showed stronger positive association with antidepressants among individuals (especially women) aged 24–53 years in 2009 and with antipsychotics among men aged 44–53 years in 2009. Skilled workers and people from lower nonmanual occupations had increased risk of medications in high-crime areas.

Conclusions: Local crime is an important predictor of mental health, independent of individual and other contextual risk factors. Place-based crime prevention and targeting vulnerable groups may have benefits for population mental health.

INTRODUCTION

Mental disorders are major contributors to global disease burden, affecting approximately 30% of the population at least once during their lifetime.[1] In addition to research on individual-level risk factors, growing attention is being paid to the wider determinants of mental health inequalities. Research has shown that the urban environment is linked with common mental disorders[2] and psychotic illnesses,[3] and this

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relationship may be explained by local differences in both social and physical conditions,[4] including income deprivation, crime, or social cohesion.[5–7]

Although most of the research on contextual risks is focused on the association with area-based poverty, evidence is more limited regarding the causal pathways linking neighborhood deprivation to mental disorders.[8] A possible mediator may be the elevated levels of crime in disadvantaged areas.[8,9] The available evidence suggests that victimization and witnessing violence directly effects psychiatric disorders.[10,11] Indirectly, crime and violence in the community may increase the threat of victimization, inducing chronic stress and fear of crime, making residents more vulnerable to psychiatric conditions.[12] Protective factors buffering the effect of stressors may be lacking in unsafe areas, as people engage less in health-promoting physical and social activities.[12]

Although associations between residing in high-crime neighborhoods and mental health problems have been reported,[8,12–14] the literature has several shortcomings. First, though substantial research focuses on depression, it is less clear whether the effect of crime varies by psychiatric condition. Second, there is a lack of studies utilizing longitudinal designs with objective measures,[8,14] which is critical to avoid reverse causation and same source bias.[15] Third, crime tends to be spatially concentrated[9]; studies using large geographic scales[14] are unlikely to provide sufficient spatial specificity. Finally, few studies have investigated the link between crime levels and mental health service use,[16–18] and there is limited evidence on medication use, the most common treatment of mental disorders.[19] The primary aim of this study is to estimate the longitudinal associations between neighborhood crime and prescribed psychotropic medications, in a large nationally representative sample of Scottish adults. Furthermore, the study explores how the inclusion of area-level socioeconomic disadvantage changes this relationship; identifies vulnerable groups by age, sex, and social grade; and tests whether different types of psychiatric conditions were more sensitive to varying crime levels.

METHODS

Study Sample

Data were drawn from the Scottish Longitudinal Study (SLS), a 5.3% nationally representative sample of the Scottish population linking administrative and statistical data sources.[20] Based on 20 semirandom birthdays,[20] the sample captures individuals present at any of the 1991, 2001, and 2011 Censuses. For this study, a subset of the original SLS sample was extracted, including adults aged ≥16 years in the 2001 Census, present in both the 2001 and 2011 Censuses and not living in communal establishments in 2011. The core SLS sample contains individual sociodemographic characteristics. Data on prescribed medications (available between 2009 and 2014) were linked to the sample using personal identifiers, and area-level crime and income deprivation (recorded in 2010–2011) were linked using 2011 Census data zones. To avoid confounding owing to inclusion of individuals with longstanding mental illness, participants with prescribed psychotropic drugs during the first 6 months of the available prescription data were excluded. The remaining sample was followed until the end of December 2014 (Appendix Figure 1, available online). Ethical approval for the research was given by the Public Benefit and Privacy Panel for Health and Social Care, National Health Service (NHS) Scotland (application number eDRIS 1516-0398) and by the Research Ethics and Integrity Committee, University of Edinburgh (GeoSciences_2018_189).

Measures

The Scottish National Prescription Information System holds all NHS prescriptions prescribed, dispensed, and reimbursed in the community across Scotland.[21] Prescriptions for 3 main types of psychotropic drugs were linked to SLS members. Antidepressants (British National Formulary 4.3) are used mainly for treating depression but also for anxiety disorders and eating disorders,[22] antipsychotics and related drugs (British National Formulary 4.2) are prescribed for psychotic and related disorders but also for unresponsive depression and anxiety,[22,23] and anxiolytics (British National Formulary 4.1.2) provide short-term relief of severe anxiety (Appendix Table 1, available online).[22] As some tricyclic antidepressants can be prescribed in lower dosages for neuropathic pain or headaches,[22] free-text dose instructions, extracted by the data owners with data-mining techniques,[24] were used to exclude low dosages (≤30 mg/day) of amitriptyline and nortriptyline from the data set. Three study outcomes were defined as having been prescribed at least 1 new medication during the 5.5 years of follow-up for antidepressants, antipsychotics, and anxiolytics.

Crime and income deprivation indicators were extracted from the 2012 release of the Scottish Index of Multiple Deprivation, available for data zones including approximately 500–1,000 household residents per unit. The crime domain consists of police-recorded and geo-referenced crimes or offenses (crimes of violence, sexual offenses, domestic housebreaking, vandalism, drug offenses, and common assault) aggregated during the 2010–2011 financial year.[25] Income deprivation captures the proportion of the population receiving financial support from the state because of low income (i.e., Income Support or Income-based Employment and Support Allowance, Job Seekers Allowance, Guarantee Pension Credit, and Tax Credit Families on low incomes).[25] Police-recorded crime and number of individuals with social benefits were divided by the respective population estimates and reported as ranks between the most and least disadvantaged areas. High, moderate, and low groups were defined for crime and income deprivation by dividing the 6,505 data zones into 3 equal groups (Figure 1), which were moderately correlated in the sample (r_S=0.64, p<0.001).

Demographic variables were reviewed for consistency between the 2001 and 2011 Censuses, and comprised information on sex (female and male), age at baseline (24–33, 34–43, 44–53, 54–63, 64–73, 74–83, and ≥84 years in 2009), and ethnicity (white, nonwhite, and missing). Other individual covariates were extracted from the 2011 Census, for which missing values have been imputed by the 2011 Census team.[26] Social

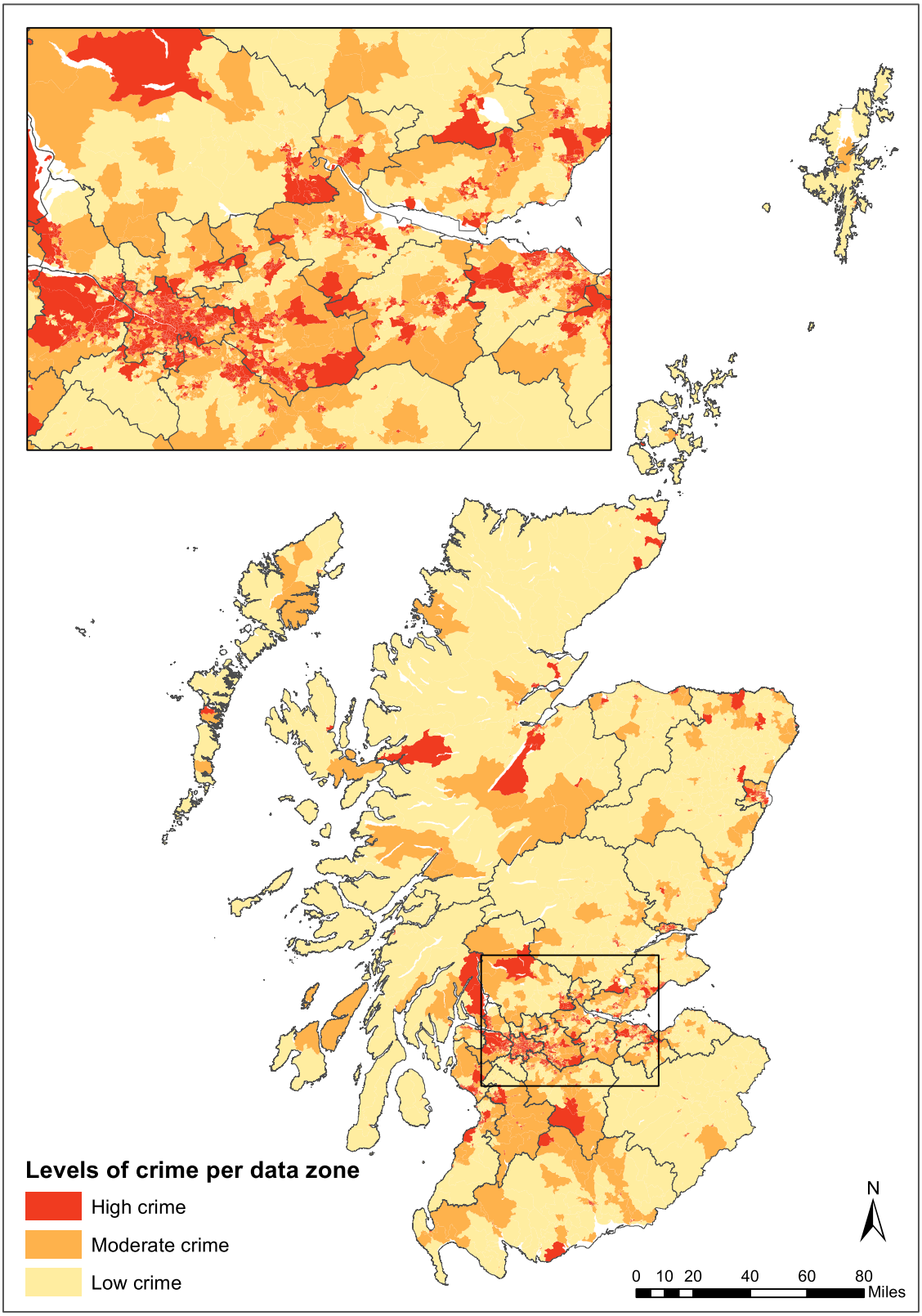

Figure 1. Levels of crime in 6,505 data zones grouped into 32 Local Authorities across Scotland. Data are presented for the whole country and for the Central Belt of Scotland. Source: Scottish Index of Multiple Deprivation 2012.

grade based on occupation ranged from higher professional groups to the lowest grade workers. Highest educational attainment provided information on qualifications classified into 5 groups ranging between no qualification and higher educational degree. Employment (employed, out of labor market, retired, and unemployed); marital status (married, single, separated, divorced, and widowed); living status (alone and with others); and the presence of long-term illness, disease, or condition other than mental health problems (yes and no) were also included in the analyses (Appendix Table 2, available online). Finally, deciles of population density per data zone were used to adjust for levels of urbanization.

Statistical Analysis

Multilevel mixed-effects logistic regressions with random intercept were fitted by calculating estimations based on QR decomposition. To adjust for unexplained variability between geographic clusters, individual observations were nested into 32 Scottish Local Authorities. Local Authorities have similarities in social care provision and labor market characteristics[27] and overlap the 14 Scottish Health Boards, responsible for population health and healthcare service delivery.[22] The very low prevalence of antipsychotic medication precluded the use of smaller geographic units.[28] Fixed effects were expressed with ORs and 95% CIs, and likelihood ratio test detected nonzero random-effects variance.[29]

In the main analyses, 3 hierarchical models were presented for the 3 medication groups; each model included data zone–level crime as the main predictor of interest. Model 1 controlled for sex and age. Model 2 adjusted for all additional individual covariates (ethnicity; social grade; educational attainment; employment status; marital status; living status; and long-term illness, disease, or condition) and population density. The final model (Model 3), presented for the entire sample and stratified by sex, explored whether crime had an additional association over and above area-level income deprivation (Appendix Figure 2, available online). As little evidence is available on the varying effect of crime across the life course and by different social groups, interactions were explored with (1) sex and age and (2) social grade. Finally, adjusted predictive margins of interaction terms were estimated with Bonferroni corrections while fixing all covariates at their means and considering the random structure of the data. Predicted probabilities were visualized in plots.

Three sets of sensitivity analyses were carried out. First, new episodes of antidepressant, antipsychotic, or anxiolytic medication were defined when at least 6 prescriptions from the same medication cluster were dispensed during follow-up. Second, as conditions with antidepressant and anxiolytic use may largely overlap, main results were provided for the outcome of having been prescribed at least 1 antidepressant or anxiolytic medication. Third, to minimize the risk of health selection into high-crime neighborhoods, models were repeated including only individuals who stayed in the same data zone during the entire study period (January 1, 2009–December 31, 2014). Information on continuous residential location was derived by SLS staff from the NHS general practitioner postcode database.

All analyses were conducted in 2018–2019 within the SLS safe setting in Edinburgh, United Kingdom, using Stata, version 13.

RESULTS

After excluding individuals with medications during the first 6 months of the study period, the analytic sample size comprised 129,945 adults from the original sample of >150,000. A small majority were female (51%) and the average age was 51.3 years in 2009. During follow-up, 22% of the sample received at least 1 new prescription for antidepressants, 2% for antipsychotics, and 11% for anxiolytics. These proportions differed significantly between groups of sample members categorized by crime tertiles of their residential area ($p<0.001$) (Table 1).

Compared with those in low-crime areas, individuals living in neighborhoods with moderate or high crime showed a significantly higher risk of having a new prescription for antidepressants during follow-up (Table 2). Associations were weaker but still significant after adjustments for covariates and population density (moderate crime: OR=1.07, 95% CI=1.03, 1.10; high crime: OR=1.17, 95% CI=1.13, 1.21). In the final model, antidepressant medication was more common among female participants and the risk decreased in older age groups (Appendix Table 3, available online); after controlling for income deprivation, residing in high-crime areas was associated with 5% higher odds (95% CI=1.00, 1.10) of antidepressant prescriptions (Table 2). There were higher odds of new antipsychotic medications in high- versus low-crime areas, even after adjustments for individual covariates and population density (OR=1.27, 95% CI=1.13, 1.44) (Table 2). In the fully controlled model, the risk of antipsychotic prescription was higher among men and in older age groups (Appendix Table 3, available online). Whereas living in high-crime neighborhoods increased the odds of new medication by 20% (95% CI=1.03, 1.39), which was attributable to the male subsample (OR=1.31, 95% CI=1.06, 1.62), income deprivation was not associated with antipsychotic prescription (Table 2). Finally, new anxiolytic medication was associated with moderate (OR=1.09, 95% CI=1.04, 1.14) and high (OR=1.17, 95% CI=1.12, 1.23) crime rates in the model with age and sex controlled. However, this association was not significant after further model adjustments, leaving only income deprivation as an area-level predictor (Table 2) (Appendix Table 4, available online).

Effect modification for the association with area crime levels was found by age and sex and by social grade. Crime had a stronger association with new antidepressants among individuals who were aged 24–53 years in 2009 (particularly in women) and with antipsychotics among men aged 44–53 years in 2009. With aging, the associations disappeared and even became negative for

Table 1. Individual and Small Area Characteristics by Crime Levels Among 129,945 Scottish Adults (%)

Variable	Low crime (*n*=47,655)	Moderate crime (*n*=45,193)	High crime (*n*=37,097)
Sex			
Male	49	49	48
Female	51	51	52
Age groups in 2009, years			
24–33	12	15	20
34–43	20	19	19
44–53	24	22	20
54–63	21	19	17
64–73	14	14	13
74–83	8	8	8
≥84	2	2	2
Ethnicity			
White	97	96	95
Nonwhite	1	1	1
Missing	2	2	3
Social grade			
AB	27	19	12
C1	32	30	27
C2	22	24	24
D	17	23	31
E	1	3	6
Education			
No qualification	21	29	38
Level 1	20	22	23
Level 2	13	12	11
Level 3	11	10	9
Level 4	36	27	19
Employment status			
Employed	65	62	57
Retired	28	28	27
Out of labor force	6	7	11
Unemployed	2	3	4
Marital status			
Married	69	59	47
Single	15	20	28
Separated	3	3	4
Divorced	7	8	11
Widowed	8	9	10
Living status			
With others	86	82	75
Alone	14	18	25
Long-term illness, disease, or condition			
No	79	77	75
Yes	21	23	25
Area population density, mean (SD)	4.4 (2.7)	5.7 (2.8)	6.4 (2.7)
Area income deprivation			
Low	71	28	7
Moderate	27	48	27
High	2	24	66
At least 1 new prescription			
Antidepressants	19	22	26
Antipsychotics	1	1	2
Anxiolytics	10	11	12

Source: Scottish Longitudinal Study.
AB, Higher or intermediate managerial, administrative, or professional grade; 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.

antidepressants and anxiolytics, indicating lower likelihood of medication in high-crime areas (Figure 2a for male and 2b for female participants). Furthermore, models indicated higher risk of new medications in high-crime neighborhoods for individuals in middle social grades: for antidepressants medication among "skilled manual workers" and for antipsychotics medication among those belonging to the "supervisory, clerical, and junior managerial, administrative, and professional" group (Appendix Figure 3, available online).

In supplementary analysis, the odds of receiving at least 6 antidepressant medications during follow-up by crime levels were comparable with the main findings, whereas the associations with anxiolytics and antipsychotics became stronger. The odds of being prescribed at least 6 antipsychotics during follow-up tripled in high-crime areas (Model 3: OR=1.57, 95% CI=1.22, 2.03) in comparison with the main results and were similarly pronounced among male and female participants (Appendix Table 5, available online). Findings for antidepressant or anxiolytic medication were comparable with the results for antidepressants (Appendix Tables 4 and 6, available online). Finally, analyses based on individuals who stayed at the same address during the entire study period yielded findings comparable with the main models (Appendix Table 7, available online).

DISCUSSION

This study suggests that crime in the residential area increases the risk for initiation of prescriptions for psychotropic medications. In addition to the relatively

Table 2. Associations Between Crime, Area Income Deprivation, and New Psychotropic Prescriptions (*n*=129,945)

Variable	Model 1[a]	Model 2[b]	Model 3[c]	Model 3: male	Model 3: female
Antidepressants					
Crime level					
Low	ref	ref	ref	ref	ref
Moderate	**1.17 (1.13, 1.21)***	**1.07 (1.03, 1.10)***	1.01 (0.97, 1.04)	1.01 (0.95, 1.07)	1.00 (0.96, 1.05)
High	**1.43 (1.38, 1.48)***	**1.17 (1.13, 1.21)***	**1.05 (1.00, 1.10)***	1.05 (0.98, 1.12)	1.04 (0.98, 1.10)
Income deprivation					
Low			ref	ref	ref
Moderate			**1.11 (1.07, 1.15)***	**1.09 (1.03, 1.15)***	**1.12 (1.07, 1.18)***
High			**1.23 (1.17, 1.29)***	**1.15 (1.07, 1.24)***	**1.27 (1.19, 1.35)***
$ICC_{Local\ Authority}$	0.34 (0.19, 0.61)	0.25 (0.13, 0.47)	0.23 (0.12, 0.44)	0.21 (0.08, 0.48)	0.20 (0.09, 0.42)
Antipsychotics					
Crime level					
Low	ref	ref	ref	ref	ref
Moderate	**1.15 (1.03, 1.29)***	1.04 (0.92, 1.17)	1.00 (0.88, 1.14)	1.04 (0.86, 1.25)	0.96 (0.82, 1.15)
High	**1.62 (1.45, 1.82)***	**1.27 (1.13, 1.44)***	**1.20 (1.03, 1.39)***	**1.31 (1.06, 1.62)***	1.10 (0.89, 1.35)
Income deprivation					
Low			ref	ref	ref
Moderate			1.08 (0.95, 1.22)	1.06 (0.88, 1.28)	1.09 (0.91, 1.30)
High			1.12 (0.96, 1.32)	1.15 (0.91, 1.45)	1.07 (0.86, 1.33)
$ICC_{Local\ Authority}$	1.97 (1.04, 3.70)	2.17 (1.17, 4.02)	2.21 (1.19, 4.07)	2.64 (1.30, 5.27)	2.26 (1.03, 4.92)
Anxiolytics					
Crime level					
Low	ref	ref	ref	ref	ref
Moderate	**1.09 (1.04, 1.14)***	1.02 (0.98, 1.07)	1.00 (0.95, 1.05)	0.99 (0.91, 1.07)	1.00 (0.94, 1.07)
High	**1.17 (1.12, 1.23)***	1.03 (0.98, 1.08)	0.99 (0.93, 1.05)	0.96 (0.87, 1.06)	1.00 (0.92, 1.08)
Income deprivation					
Low			ref	ref	ref
Moderate			**1.06 (1.01, 1.12)***	**1.07 (0.99, 1.16)****	**1.06 (0.99, 1.13)****
High			**1.09 (1.02, 1.16)***	1.09 (0.98, 1.20)	**1.08 (1.00, 1.17)****
$ICC_{Local\ Authority}$	0.33 (0.18, 0.61)	0.34 (0.18, 0.64)	0.34 (0.18, 0.64)	0.34 (0.14, 0.79)	0.38 (0.20, 0.74)

Source: Scottish Longitudinal Study.
Note: Boldface indicates significant associations (*p<0.05), trend-wise (**p<0.1). Estimates are expressed in OR with 95% CI.
[a]Model 1: Adjusted for sex and age.
[b]Model 2: Model 1 + adjusted for ethnicity; social grade; educational attainment; employment status; marital status; living status; having a long-term illness, disease, or condition; and area population density.
[c]Model 3: Model 2 + adjusted for area income deprivation.
ICC, intraclass correlation coefficient.

strong link to income deprivation, higher local crime rate slightly increased the likelihood of having antidepressant prescriptions. This was mainly attributable to higher vulnerability among individuals aged 24–53 years in 2009. Only crime levels, and not income deprivation, predicted the risk of antipsychotic prescriptions, and the association was particularly pronounced among men aged 44–53 years in 2009. There was no association between crime and anxiolytics medication. Among individuals with middle social grades, those living in higher-crime areas had elevated risk of antidepressant and antipsychotic medications.

Although the general findings on the increased risk of mental disorders in high-crime areas are consistent with previous evidence utilizing cross-sectional and longitudinal data on self-reported mental health,[8,13,14,18] this study highlights differing relationships by medication types. For antidepressants, the association with crime was accompanied by a strong link with area poverty, indicating that other area-based mechanisms, in addition to crime, might operate in disadvantaged neighborhoods to affect these conditions.[8] The relationship between crime and antipsychotic drugs was 4 times stronger than for antidepressant medications, whereas no other area-level association was related. Although no previous person-level evidence is available, this result is in line with an ecologic investigation from London, United Kingdom on the incidence of first-episode

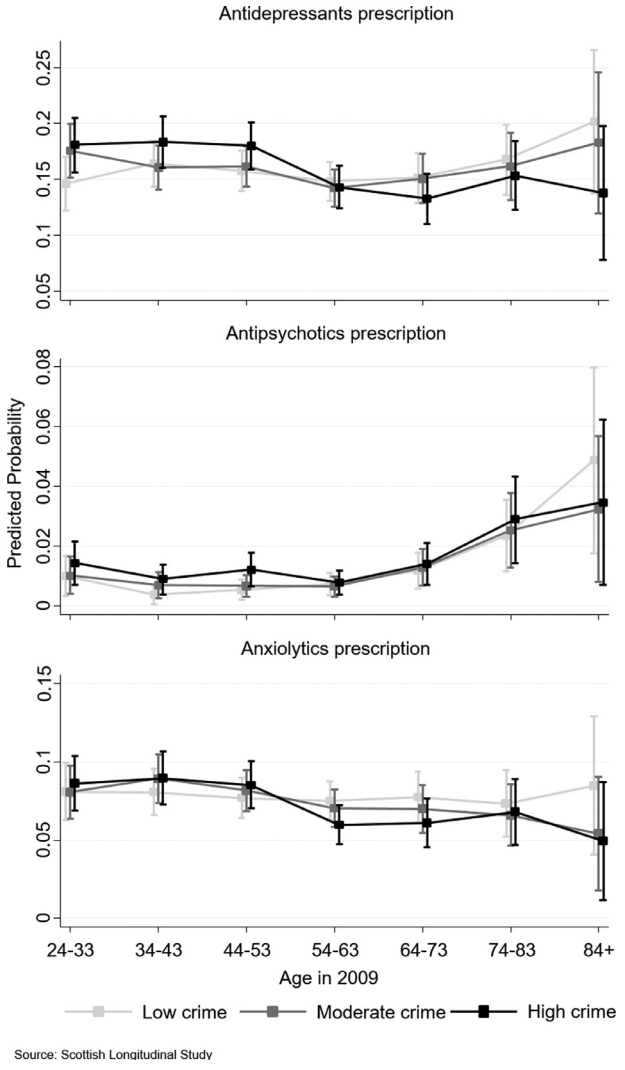

Figure 2. Adjusted predictions for new psychotropic prescriptions by age groups and crime levels (n=129,945). (**a**) Predictions in males and (**b**) females. Models were adjusted for ethnicity; social grade; educational attainment; employment status; marital status; living status; having a long-term illness, disease, or condition; area population density; and area income deprivation and corrected for multiple comparison (Bonferroni correction).

schizophrenia,[18] highlighting the predominance of community exposure to crime and violence in the etiology of psychoses, over other contextual determinants. In addition to previously outlined pathways, the strong link between antipsychotics and neighborhood crime in this sample, particularly among middle-aged men, might be related to increased drug use in high-crime areas,[12] which has been linked to psychosis incidence.[30] Also, nonadherence to antipsychotic medications may vary across crime levels, explaining higher risk of new prescriptions in high-crime neighborhoods. With regard to service use for anxiety disorders, income deprivation rather than crime may explain spatial patterning in disadvantaged neighborhoods, supporting results in a previous study using inpatient and outpatient contact in Malmö, Sweden.[17] However, the relationship among crime, mental health, and mental health service use is particularly complex. Not only can exposure to crime influence mental health problems, but individuals with existing psychiatric conditions are at higher risk of victimization[31] and more likely to commit violent offenses.[32] Furthermore, though findings reported here indicated decreasing effect sizes of crime from antipsychotic to anxiolytic prescriptions, the treatment gap widens from psychotic to depressive and anxiety disorders.[33,34] This dose–response relationship between the severity of condition and probability of treatment suggests that there may be greater underestimation of the real effect of crime on mental health when utilizing anxiolytic and antidepressant medications.

Stronger relationships between neighborhood crime and mental health problems for those in middle social grades can be explained by the combined effects of lack of personal resources and lower adaptation to chronic neighborhood stressors. People with higher social positions may be better equipped with material and social resources[35] protecting them from the detrimental effect of crime. By contrast, adaptation to chronic stressors (e.g., based on previous exposures) or saturation of contextual effects over and above individual risk could provide an explanation for nonsignificant effects in lower social grades. Contrary to other literature,[8] this study found that, among older adults, the use of antidepressants and anxiolytics was less likely as crime level increased, whereas the positive association with area income deprivation remained. Although declining mobility in older age may increase the exposure to neighborhood nuisances affecting mental health, there is also evidence of lower engagement in physical activity and walking in unsafe neighborhoods in this age group.[36] It is plausible that elevated local crime may further restrict individuals from leaving their home to consult a health practitioner, independent of their mental health status. However, psychotropic medications in this age group should be interpreted with caution as they may indicate physical and neurologic comorbidities[22,37]; also, higher mortality in violent areas[38] may result in a more selected and resilient older populations than in low-crime areas.

Limitations

This longitudinal data linkage study benefited from a large-scale nationally representative sample, comprising detailed individual-level information on personal attributes.[20] Prescriptions are routinely collected and quality checked by NHS Scotland, which provides

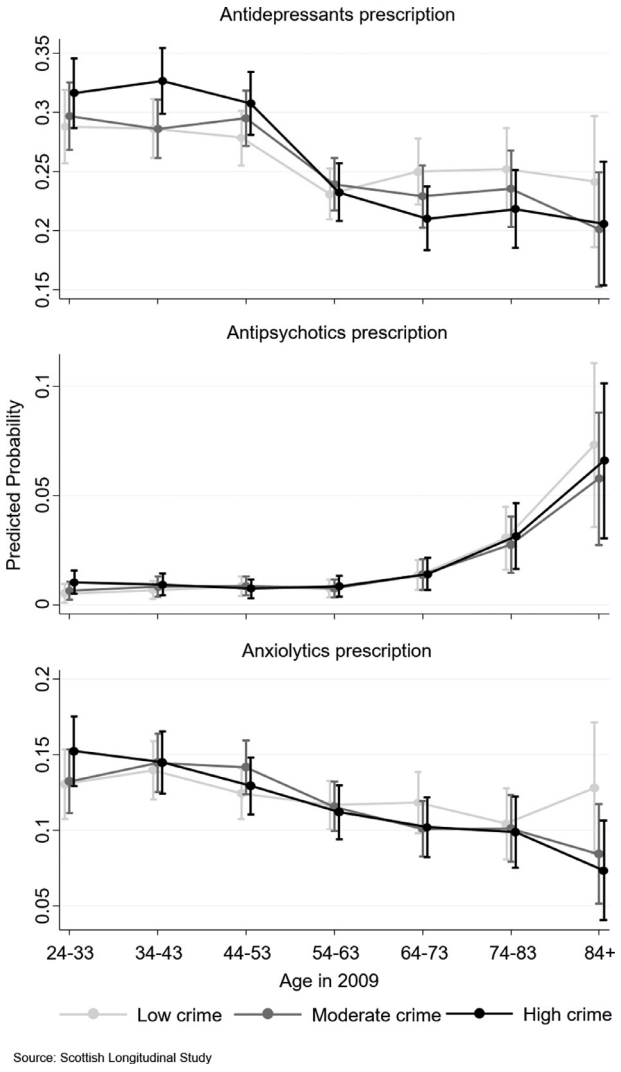

Figure 2. Continued.

comprehensive health care funded through general taxation and is almost universally used by patients seeking health services in the whole population.[21] As prescriptions have to be submitted to NHS Scotland by dispensers for reimbursement, it has an exceptionally high level of completeness enabling longitudinal data linkage: general practitioners account for more than 95% of total prescribing in the primary care, and 98.7% of their prescriptions had personal identifiers in 2014.[21]

However, several limitations need to be considered. First, the outcome measure was derived from service use. Access to primary health care or mental health stigma may vary by neighborhoods. Furthermore, prescribing behavior between primary healthcare providers can be spatially patterned,[39] independent from health and social care differences on the Local Authority level (which has been taken into consideration in this study). Second, psychotropic drugs are a proxy for psychiatric disorders and can be prescribed for other conditions. A substantial number of patients with dementia receive antipsychotic and antidepressant prescriptions even in the complete absence of depression or psychosis.[23,40] Third, prescriptions before 2009 are not available.[21] Despite excluding individuals with ongoing medication and controlling for residential movements during the study, it still remains plausible that individuals with psychiatric history, especially with psychoses,[6] were already selected in high-crime areas. Future longitudinal research should explore the complex spatial–temporal associations between crime and mental disorders using longer follow-ups and repeated measurements.

CONCLUSIONS

Using objective, small area-level measures, this study provided prospective evidence that neighborhood crime is associated with new antidepressant and antipsychotic medication independent of area deprivation, urbanization, and a range of individual characteristics. Targeting high-crime areas with crime prevention or area-based interventions (e.g., rehabilitating deprived areas, mitigating deteriorated housing, or greening vacant parcels) may reduce crime,[41] which can be beneficial for mental health. It may also be prudent for healthcare planners to enhance mental health services in the vicinity of violent areas,[13] providing prevention and treatment opportunities especially for those more vulnerable to the effects of crime.

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GB designed the study, conducted data analyses, interpreted the results, and prepared the first draft. JRP and CD participated in the study design, in the interpretation of the findings, and commented on the manuscript. MC and SC contributed to the interpretation and revised the manuscript.

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SUPPLEMENTAL MATERIAL

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