
Article:
Finegan, M., Firth, N. orcid.org/0000-0003-1984-6869 and Delgadillo, J. orcid.org/0000-0001-5349-230X (2019) Adverse impact of neighbourhood socioeconomic deprivation on psychological treatment outcomes : the role of area-level income and crime. Psychotherapy Research, 30 (4). pp. 546-554. ISSN 1050-3307

https://doi.org/10.1080/10503307.2019.1649500

Citation: Finegan, M., Firth, N., Delgadillo, J. (*in press*). Adverse impact of neighbourhood socioeconomic deprivation on psychological treatment outcomes: the role of area-level income and crime. *Psychotherapy Research*. https://doi.org/10.1080/10503307.2019.1649500

Adverse impact of neighbourhood socioeconomic deprivation on psychological treatment outcomes: the role of area-level income and crime

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Declarations of interest: None.

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Abstract

Aim: Socioeconomic deprivation is known to be associated with depression and anxiety symptoms. This study aimed to investigate the influence of several domains of neighbourhood deprivation on psychological treatment outcomes.

Method: Healthcare records from 44805 patients who accessed psychological treatment were analysed. Patient-level depression (PHQ-9) and anxiety (GAD-7) outcome measures were linked to their neighbourhood statistics, including area-level indices of income, unemployment, education, health and disability, crime, housing quality, and quality of the local environment. Linear regressions were applied to examine associations between these domains and post-treatment symptom severity after controlling for patient-level and service-level variables.

Results: Neighbourhood income and crime rates were associated with depression and anxiety symptoms after controlling for covariates, explaining 4% to 5% of variability in treatment outcomes. Patients living in low-income areas required a higher number of treatment sessions to benefit from therapy.

Conclusions: Patients living in economically deprived neighbourhoods tend to have poorer depression and anxiety treatment outcomes and require lengthier interventions.

Keywords: socioeconomic deprivation; psychological therapy; depression; anxiety

Introduction

Socioeconomic deprivation refers to living in poverty, having less access to resources in comparison to local population norms, and being exposed to a multitude of adverse social circumstances that impact on quality of life (Murali & Oyebode, 2004). This may include poor access to housing, exposure to crime, poor access to healthcare and poor opportunity for education and employment. Socioeconomic deprivation is known to be associated with various social problems such as hostility and racism, and physical health problems such as high mortality rates and obesity (Wilkinson & Pickett, 2007; Adjaye-Gbewonyo 2012). Associations between socioeconomic deprivation and poor mental health are also well documented (e.g., Murali & Oyebode, 2004; Fryers, Melzer & Jenkins, 2003; Silva, Loureiro & Cardoso, 2016).

Theories attempting to explain this relationship suggest that living and social environmental factors can be both determinants and consequences of common mental health symptoms. *Social-selection* and *social-causation* are two prominent theories that offer alternative hypotheses for these associations (Mossakowski, 2014). Social-selection proposes that predispositions to mental health difficulties lead to a "downward drift" in socioeconomic position due to the struggle to maintain healthy functioning or to rise out of hardship, while social-causation suggests that chronic stress due to financial and environmental adversity contributes to and precipitates the development of mental health problems (Dohrenwend et al., 1992; Gallo & Matthews, 2003). However, it is unclear which specific aspects of neighbourhood deprivation (e.g., financial strain, crime rates, quality of housing, etc.) may be most strongly related with mental health.

Using the English Index of Multiple Deprivation (IMD; Department for Communities and Local Government, 2015), previous studies have indicated that people living in highly deprived areas have lower probabilities of accessing psychological care (e.g., Delgadillo, Farnfield, & North, 2018; Grant et al., 2012; Saxon et al., 2007; Self, Oates, Pinnock-Hamilton, & Leach, 2005), and when they do so, they have a lower likelihood of recovery from depression and anxiety symptoms (Clark et al., 2018; Delgadillo, Asaria, Ali, & Gilbody, 2016). A remarkable observation in recent studies is that area-level factors (e.g., neighbourhood deprivation) have an adverse influence over psychological treatment outcomes even after controlling for patient-level characteristics such as baseline symptom severity, functional impairment,

employment status and comorbid chronic health problems (Delgadillo, Kellett et al., 2016; Delgadillo, Dawson, Gilbody, & Boehnke, 2017; Green et al., 2015). This suggests that socioeconomic deprivation is not merely a proxy measure of individual health or employment status; it is a contextual variable that has unique prognostic value for depression and anxiety problems. In spite of the replication of this finding in large and socioeconomically diverse clinical samples, the association between neighbourhood indices of socioeconomic deprivation and psychological treatment outcomes is not fully understood.

Using a large clinical dataset from multiple psychological therapy services for depression and anxiety problems, the present study aimed to investigate associations between specific domains of neighbourhood socioeconomic deprivation (e.g., income, unemployment, education, crime, etc.) and psychological treatment outcomes.

Methods

Design and Setting

This study was based on the analysis of routinely collected demographic and clinical data, aggregated for patients who accessed treatment across five psychological therapy services, during a two-year period between January 2013 – 2015. These services were members of the Northern IAPT Practice Research Network (described by Lucock et al., 2017). Together, these services covered several urban, suburban, rural, and socioeconomically diverse areas across West Yorkshire, South Yorkshire and Cumbria.

Consistent with national treatment guidelines (National Institute for Health and Care Excellence, 2011), these services offer standardised low and high intensity psychological interventions for depression anxiety problems, organised in a stepped care model. *Low intensity therapies* are short-term (≤8 sessions) psychoeducational interventions based on principles of cognitive behavioural therapy (CBT) and delivered by qualified mental health practitioners. Low intensity therapies were offered to patients with mild-to-moderate depression and anxiety problems, as an initial treatment option, and were delivered in a variety of formats (individual therapy, group therapy, or computerised CBT). *High intensity therapies* are lengthier (up to 20 sessions) interventions delivered by qualified counsellors and psychotherapists, following evidence-based and protocol-driven treatment models including CBT, interpersonal psychotherapy, dynamic interpersonal therapy and eye-movement desensitization and reprocessing.

These high intensity therapies were offered to patients who had not improved after accessing low intensity therapies, or to those who had more severe or complex presentations. Access to treatment was defined in the current study based on patients attending at least one therapy session following an initial assessment.

Ethical approval for the analysis of this multi-service dataset was obtained from an NHS research ethics committee (North East-Newcastle & North Tyneside) and approved by the Health Research Authority (REC Reference: 15/NE/0062).

Measures and data sources

Clinical outcome measures. Patients accessing the participating services completed standardised outcome measures on a session-to-session basis to monitor progress. Baseline and final (last observed) scores from these measures were examined.

The PHQ-9 is a nine-item outcome measure for depression (Kroenke, Spitzer, & Williams, 2001). Each item is scored on a 0–3 scale and these are summed to derive an overall severity rating (range 0–27). This measure has been extensively validated in primary care populations with adequate sensitivity (88%) and specificity (88%) estimates for the detection of major depressive disorder using a cut-off score ≥10 (Kroenke et al., 2001). The GAD-7 is a seven-item case-finding measure for generalized anxiety disorder and other anxiety disorders (Kroenke et al., 2007). Each item is scored on a 0–3 scale and these are summed to derive an overall severity rating (range 0–21). The GAD-7 has been found to be a valid and reliable screening tool using a cut-off score ≥8 to detect an anxiety disorder with adequate sensitivity (77%) and specificity (82%).

Secondary clinical and demographic data. The Work and Social Adjustment Scale (WSAS) is a measure of functional impairment (Mundt et al, 2002), assessing the impact of mental health problems on five domains (work, home management, social life, leisure activities, family and relationships) using Likert scales ranging between 0–8 (0 = no impairment; 8 = severe impairment). Anonymised demographic and clinical data included: age, gender, ethnicity, employment status, and use of antidepressant medication.

Neighbourhood socioeconomic deprivation data. Each patient's home postcode was linked to the English Index of Multiple Deprivation (IMD; Department for Communities and Local Government, 2015). Postcodes were later removed from the dataset after successful data-linkage to safeguard

anonymity. The IMD is a measure of relative deprivation for small geographical areas in England (neighbourhoods with an average of 1,500 residents in each), referred to as Lower-layer Super Output Areas (LSOA). The IMD ranks each LSOA from the most to the least deprived, based on a composite index that includes information about seven domains of area-level deprivation: income deprivation, unemployment, education level, poor health and disability, crime, barriers to housing and services, and quality of the local environment. The local-area indices in each of these domains are weighted, based on the work of Townsend (1979; 1987), and aggregated into local IMD scores and decile groups (where 1 = most deprived, 10 = least deprived areas).

The data-linkage procedure matched each patient to their corresponding neighbourhood IMD, and decile classifications for each of the seven IMD domains. Typically, decile 1 corresponds to the 10% most deprived areas, and decile 10 corresponds to the 10% least deprived areas in England. However, the employment domain is reverse-scored (decile 10 = greater % of unemployed residents).

[Figure 1]

Data Analysis

Figure 1 illustrates the sample selection procedure for this study. Overall, 97020 patients were referred to participating services during a two-year period, of whom 48698 (50.2%) accessed at least 1 treatment session after initial assessment. Those who did not attend initial assessments (N= 15555) or initial treatment sessions after assessment (N = 32759) were excluded from analysis. The small proportion of cases with missing IMD data (< 1.4%) and matched pre-post treatment outcomes data (< 8%) were also excluded from analyses. The resulting sample included N = 44805 cases which were used to carry out data analyses in two stages. Data imputation was not deemed necessary given the small proportion (<10%) of cases with missing outcome measures.

Stage 1: *Variable selection.* We started by examining Spearman's correlations between the IMD composite variable with baseline and post-treatment depression (PHQ-9) and anxiety (GAD-7) scores. Next, we examined associations between the seven domains of socioeconomic deprivation with post-treatment PHQ-9 and GAD-7 scores, using separate models for each outcome measure. Multicollinearity

between IMD domains was expected, so LASSO regularization (Tibshirani, 1996) was performed to exclude variables that did not improve predictive value and which covaried strongly with others. LASSO selects variables by shrinking (penalizing) beta coefficients toward zero, aiming to yield sparse models that reduce multicollinearity and minimize overfitting. In order to determine the model with minimal expected prediction error, a 10-fold cross-validation approach was applied in combination with the 1 standard error rule (Rodriguez, Perez, & Lozano, 2010). As an additional approach to minimise multicollinearity, the LASSO procedure was combined with optimal scaling (Gifi, 1990), which rescales each predictor using splines to optimally model non-linear relationships with the dependent variable.

Stage 2: *Hypothesis testing*. Stepwise linear regression models were used with the optimally scaled IMD variables selected as potential predictors in Stage 1. Separate regression analyses were carried out for PHQ-9 and GAD-7 post-treatment scores as the dependent variable. Predictor variables were entered in 3 blocks. Block 1: Entering neighbourhood-level IMD domains selected in stage 1. Block 2: Additionally controlling for available patient-level case-mix variables. Block 3: Additionally controlling for treatment variables (services, therapy sessions attended). Dummy variables for services were entered as fixed effects (instead of random effects), since we could not treat these as if they were randomly selected from the wider population of stepped care psychological services in England. In this way, we were able to assess if any neighbourhood-level IMD domains were associated with treatment outcomes after controlling for patient case-mix factors and services. In a secondary analysis, we re-ran the fully adjusted model described above, additionally including interaction terms between treatment sessions and each of the IMD domains found to predict treatment outcomes.

Results

Sample characteristics

Table 1 displays baseline characteristics for the sample included in analysis. The number of patients within each IMD decile group ranged from 2,409 (min) to 8,176 (max), indicating that sufficient observations were available in each IMD category to perform subsequent analyses. The distribution of cases across IMD deciles was significantly different between the five treatment services; Kruskal-Wallis

test: H(4) = 901.21, $p < 0.001$. This indicated that some services were working in more socioeconomically deprived areas.

[Table 1]

Stage 1: Variable selection. The composite IMD variable was inversely correlated with baseline and post-treatment PHQ-9 (pre-treatment $r = -0.20$, $p < .001$; post-treatment $r = -0.20$, $p < .001$) and GAD-7 (pre-treatment $r = -0.15$, $p < .001$; post-treatment $r = -0.19$, $p < .001$) scores. This indicated that patients living in more deprived neighbourhoods tended to have higher symptom severity before and after treatment, compared to those living in less deprived neighbourhoods. Table 2 shows the results of the LASSO variable selection procedure (beta coefficients and standard errors), where variables with coefficients shrunken to exactly zero were deemed to have no predictive value. Four IMD domains were selected into both PHQ-9 and GAD-7 models: income, education, health / disability, and crime. Neighbourhood unemployment was only selected in the GAD-7 model.

[Table 2]

Stage 2: Hypothesis testing. The five domains selected in Stage 1 were examined in stepwise linear regression models. Initial analyses of variables included in block 1 confirmed that multicollinearity indices for the IMD variables were acceptable in the PHQ-9 model (VIF <10). However, in the GAD-7 model, the income (VIF = 12.21) and unemployment (VIF = 11.25) domains had unacceptably high multicollinearity indices. Therefore, the unemployment domain was removed from GAD-7 regression models since it was not statistically significant (B = -0.19, SE = 0.12, $p = .11$) and its removal reduced all VIF indices to an acceptable level (< 10).

Results were highly consistent for both outcome measures, as shown in Table 3 which displays the fully adjusted (blocks 1–3) regression models. After controlling for patient case-mix and treatment variables, neighbourhood-level income and crime rates were significantly associated with clinical outcomes in the expected direction (patients living in less deprived neighbourhoods had lower post-

treatment symptom severity). Neighbourhood-level variables explained between 4% to 5% of variability in treatment outcomes, and including case-mix and treatment variables in the model explained between 32% and 36%. Poorer treatment outcomes were associated with younger age, being unemployed, being from a minority ethnic group, being prescribed antidepressant medications, and having higher baseline symptom severity (PHQ-9, GAD-7) and functional impairment (WSAS). Attending a higher number of treatment sessions was associated with lower post-treatment symptom severity.

In a secondary analysis adjusting for all variables displayed in Table 3, we found that the interaction between treatment sessions x neighbourhood income was statistically significant (PHQ-9 model, B = 0.03, SE = 0.01, $p < .001$; GAD-7 model, B = 0.03, SE = 0.01, $p < .001$). The interaction between treatment sessions x neighbourhood crime rates was not significant (PHQ-9 model, B = 0.01, SE = 0.01, $p < .28$; GAD-7 model, B = 0.01, SE = 0.01, $p < .39$).

[Table 3]

Discussion

Interpretation of findings

Consistent with previous studies in stepped care psychological services (Delgadillo, Asaria, et al., 2016; Delgadillo, Kellett et al., 2016; Delgadillo et al., 2017; Firth et al., 2015; Green et al., 2015), higher neighbourhood socioeconomic deprivation was significantly associated with poorer depression and anxiety treatment outcomes. The association between socioeconomic deprivation and psychotherapy outcomes is well established in the clinical psychology literature (Finegan, Firth, Wojnarowski, & Delgadillo, 2018), however less is known about the mechanisms that explain associations between neighbourhood features and individual treatment response.

Unemployed patients tended to have poorer treatment outcomes. This observation fits with previous studies that have measured individual-level income (Cort et al., 2012; Falconnier, 2009; Kelly, Jakubovski & Bloch, 2015; Pirkis et al., 2011), and employment (Cort et al., 2012; Delgadillo et al., 2017; El Alaoui et al., 2015; Firth, Barkham, Kellett & Saxon, 2015; Kelly et al., 2015; van der Lem, Stamsnieder, van der Wee, van Veen & Zitman, 2013) as predictors of treatment outcomes. These studies

indicate that a more favourable financial situation may enhance treatment outcomes, plausibly because greater income enables access to health-enhancing goods and services, as suggested by a systematic review of studies investigating the association between income and self-rated health (Gunasekara et al., 2011). Furthermore, it is plausible that employment also has psychosocial benefits, providing a sense of social connectedness and purpose. Conversely, according to the *downward drift* hypothesis, people with chronic health and emotional problems may find it difficult to obtain and sustain employment, thus leading to social isolation and demoralisation (Dohrenwend et al., 1992).

Furthermore, our findings indicate that neighbourhood income and crime rates influence psychological improvement even after controlling for individual employment status, treatment duration, and several other demographic and clinical features. This may possibly reflect the influence of a more favourable financial support network in wealthier neighbourhoods (e.g., other household members or wider family networks may be in employment and/or have access to income). On the other hand, area-level poverty and crime rates could have a generally demoralising effect on residents, even if they are in employment and have access to financial means. According to the *relative deprivation hypothesis*, some people living in deprived neighbourhoods may perceive themselves as having a lower social status, which is associated with psychosocial stress (Smith, Pettigrew, Pippin, & Bialosiewicz, 2012) and a reduced sense of control over one's life (Marmot, 2004). The function of social comparison which is inherent to the perception of relative deprivation may be especially important for people with major depressive disorder, who are prone to have self-demeaning thoughts and a sense of worthlessness. Our findings indicate that patients living in low income neighbourhoods tended to have better outcomes if they accessed longer treatments. This suggests that the adverse influence of environmental poverty (neighbourhood income) can be mitigated through psychotherapy, which fits with the relative deprivation hypothesis, since therapy could help to modify the person's sense of self-worth, hope and control.

These findings highlight the impact of specific area-level factors over psychological wellbeing and indicate that these neighbourhood statistics are not merely proxy measures of individual-level factors such as employment or income. Neighbourhood socioeconomic variables explained approximately 4% to 5% of variability in treatment outcomes, which is comparable in magnitude to the variance explained by *therapist effects* in naturalistic studies (Baldwin & Imel, 2013). This suggests that the environment plays

a substantial role in the recovery of patients with common mental health problems, broadly in line with social causation theory (Dohrenwend et al., 1992). From a psychological perspective, the notion of *learned helplessness* (Seligman, 1975) may offer a useful conceptual basis to understand the demoralising effects of adverse environments over individuals. Previous studies have found associations between a sense of hopelessness with exposure to material deprivation, violence and crime (e.g. DuRant, Getts, Cadenhead, Emans, & Woods, 1995), thus potentially resulting in a reduced perception of one's ability to overcome adversity and attain personal goals. It is possible, therefore, that neighbourhood deprivation impacts on psychological treatment outcomes through material (e.g., financial access to health-enhancing goods) and psychological pathways (e.g., negative appraisal of one's worth and reduced sense of control to meet life goals or to escape adversity). We note, however, that our interpretations of the data presented in this study are speculative and based on indirect evidence from other studies. We did not collect data on supposed mediators such as learned helplessness, self-esteem or self-efficacy, and future studies could aim to do so in order to better understand the relationship between socioeconomic features of the environment and psychological treatment outcomes.

It is also of interest to note that there were significant differences in clinical outcomes between services included in this study, after controlling for neighbourhood and patient variables, as evidenced in Table 3. Recent research investigating outcome differences between services has highlighted that this is partly explained by service-level features such as waiting times, mean treatment duration and the percentage of patients that access high intensity psychological interventions (Clark et al., 2018).

Strengths and Limitations

To our knowledge, this is the first study to investigate associations between specific domains of neighbourhood socioeconomic deprivation and psychological treatment outcomes. This large (N = 44,805) multi-service clinical dataset was adequately powered to carry out hypothesis testing using a multivariable model. The participating services were also using the same stepped care treatment model, interventions and outcome measures as other comparable services linked to the English IAPT programme. These aspects of the study enhance its external validity and generalisability, particularly since the sample characteristics and clinical outcomes are broadly comparable to national trends (see NHS Digital, 2016).

Some limitations concerned the intrinsic multicollinearity which is to be expected when examining various domains of deprivation (e.g., income, employment, crime) that are interrelated and form part of a composite construct of socioeconomic deprivation (IMD). We took steps to mitigate the influence of multicollinearity using a rigorous variable selection procedure (LASSO regularization) and by rescaling variables to optimally model non-linear associations. Furthermore, the examination of neighbourhood features was limited to the seven domains that are linked to the index of multiple deprivation. Future studies could collect and examine data on other area-level features. For example, participation in community activities can increase feelings of purpose and belonging, and reduce feelings of isolation or loneliness which can be associated with depression and anxiety (Hawkley & Cacioppo, 2010). Bruce and Hoff (1994) found that social isolation partly mediates the association between socioeconomic status and mood disorders, as the effect of poverty reduced significantly when they controlled for the degree of isolation from loved ones. Future studies could help us to learn more about the material and psychological pathways that either support or hinder recovery from common mental disorders.

Implications for policy and practice

A pragmatic implication of our findings is that patients living in low-income neighbourhoods should be offered a higher than average number of treatment sessions to benefit from therapy. This could be considered during the initial stages of treatment, when therapists are in a position to assess the patient's wider social and occupational circumstances and when a contract for the duration of treatment is discussed. Psychosocial interventions aimed at reducing feelings of hopelessness, and empowering people by changing beliefs about their social environment have been proposed in the past (Bolland et al., 2005), and there are also well-established interventions for those in financial and employment difficulty (Karagiannaki, 2007). For example, a recent study demonstrated that welfare and debt advice co-located within primary healthcare improves short-term mental health and well-being, and reduces financial strain (Woodhead, Khondoker, Lomas, & Raine, 2017). Building these components into the support structures available in primary care may be potentially beneficial to socioeconomically disadvantaged people accessing treatment for depression and anxiety problems. Augmenting formal psychological treatment with debt and financial advice (e.g., each intervention delivered by a relevant specialist, working as part

of a team) could be a potentially fruitful avenue for future research. It is also clear from national statistical reports that socioeconomic deprivation adversely impacts on mental healthcare utilisation (Delgadillo et al., 2018) and outcomes (Clark et al., 2018; Delgadillo et al., 2016). This highlights the need to consider deprivation as an important public health problem and a major hindrance to the successful implementation of psychological care. From this perspective, reducing socioeconomic deprivation, promoting equality and social justice are important social policy goals that extend far beyond the confines of psychology and mental healthcare.

Acknowledgements: This study was supported by the Northern IAPT Practice Research Network (www.iaptprn.com), a collaboration between academic researchers and psychological services in the north of England. Ethical approval, access permissions and data sourcing were enabled by by Jaime Delgadillo, Mike Lucock, Michael Barkham, Dean McMillan, Gillian Donohoe, Stephen Kellett, Sarah Mullaney, Richard Thwaites. The development of the IAPT PRN dataset was supported by NHS Research Capability Funding from the West Yorkshire Clinical Commissioning Groups (Reference: RCF 2014 010). The dataset was used for research purposes with the approval of the Health Research Authority (REC Reference: 15/NE/0062).

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Figure 1: Sample selection flow diagram

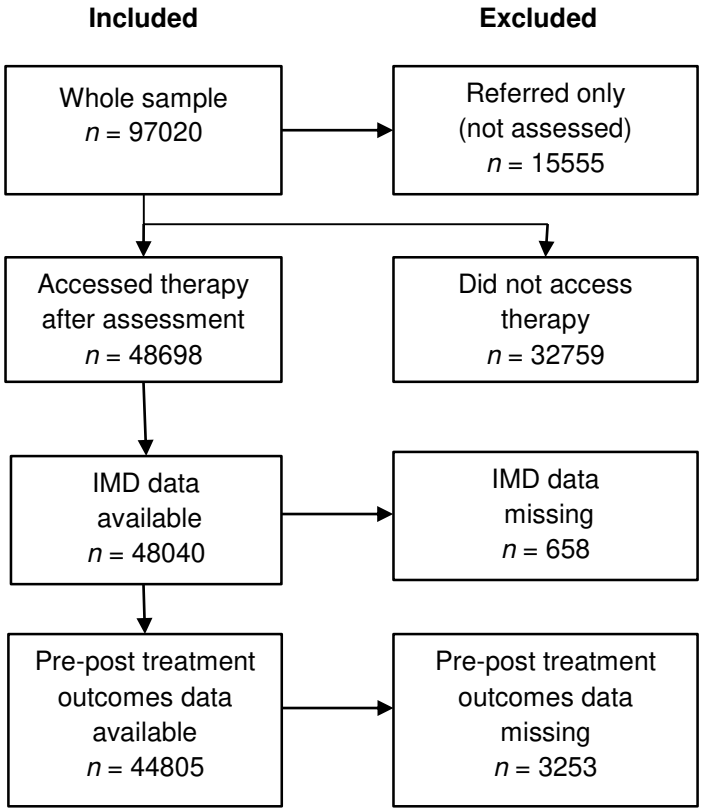

Table 1. Sample characteristics

Characteristics	**N = 44805**
Demographics	
Mean age (SD)	41.73 (14.66)
Females (%)	28963 (64.6)
Unemployed* (%)	10361 (24.4%)
Ethnicity*	
White British (%)	37464 (92.7%)
Other (%)	2930 (7.3%)
Source of referral*	
GP (%)	22047 (49.3%)
Self-referral (%)	18245 (40.8%)
Other (%)	4472 (9.9)%
Baseline clinical characteristics	
PHQ-9 mean (SD)	15.05 (6.26)
GAD-7 mean (SD)	13.46 (5.13)
WSAS mean (SD)	18.45 (9.27)
Prescribed pharmacotherapy* (%)	24358 (57.5%)
Primary diagnosis*	
Affective disorder	9885 (24.9%)
Mixed anxiety and depression	13037 (32.9%)
Generalized anxiety disorder	4576 (11.5%)
Other	12163 (30.7%)
Sample sizes across services	
Service A (%)	12207 (27.2%)
Service B (%)	11542 (25.8%)
Service C (%)	4502 (10.0%)
Service D (%)	5192 (11.6%)
Service E (%)	11362 (25.4%)

* Percentages exclude cases with missing data; PHQ-9 = measure of depressions symptoms; GAD-7 = measure of anxiety symptoms; WSAS = work and social adjustment scale; GP = general medical practitioner

Table 2. Variable selection using Lasso regularization

Domain	**L1 Regularized coefficients (and Standard Error)**	
	PHQ-9 model F (12, 44774) = 173.12 $p < .001$ $R^2 = .05$	**GAD-7** F (15, 44719) = 117.00, $p < .001$ $R^2 = .04$
Income	-0.11 (0.01)	-0.10 (0.01)
%Unemployment	0.00 (0.00)	-0.003 (0.01)
Education	-0.04 (0.01)	-0.04 (0.01)
Health & Disability	-0.01 (0.01)	-0.004 (0.01)
Crime Level	-0.004 (0.01)	-0.002 (0.004)
Housing	0.00 (0.00)	0.00 (0.00)
Living Environment	0.00 (0.00)	0.00 (0.00)

Note: Lasso (L1) regularization models applied a conventional alpha hyper-parameter of 0.50, where the dependent variable was post-treatment PHQ-9 or GAD-7. An optimal penalty value was selected via 10-fold cross-validation, using the 1 standard error rule to attain a parsimonious model. Coefficients shrunken to 0.00 were not selected as potential predictors of post-treatment symptoms.

Table 3. Regression models predicting post-treatment depression (PHQ-9) and anxiety (GAD-7) symptoms

Variables	Fully adjusted PHQ-9 Model F (15, 29730) = 950.99, $p < .001$ $R^2 = .32$						Fully adjusted GAD-7 Model F (15, 29727) = 779.22, $p < .001$ $R^2 = .28$					
	B	SE	*p*	95% CI Low	95% CI High	VIF	B	SE	*p*	95% CI Low	95% CI High	VIF
Constant	0.50	0.19	.01	0.12	0.87		0.85	0.17	<.001	0.52	1.18	
IMD variables (Block 1)												
Income	-0.20	0.09	.02	-0.38	-0.03	6.91	-0.23	0.08	<.001	-0.38	-0.07	6.96
Education	-0.09	0.07	.25	-0.23	0.06	4.72	-0.09	0.07	.15	-0.22	0.03	4.66
Health & Disability	-0.10	0.07	.17	-0.23	0.04	4.18	-0.02	0.06	.72	-0.15	0.10	4.28
Crime	-0.15	0.05	.01	-0.25	-0.05	2.12	-0.11	0.05	.01	-0.20	-0.02	2.07
Patient case-mix variables (Block 2)												
Age	-0.02	0.002	<.001	-0.02	-0.01	1.05	-0.02	0.002	<.001	-0.03	-0.02	1.05
Employment status	2.45	0.08	<.001	2.29	2.61	1.12	2.00	0.07	<.001	1.85	2.14	1.12
Ethnicity	0.73	0.13	<.001	0.48	0.99	1.05	0.60	0.12	<.001	0.38	0.83	1.05
Medications	0.41	0.07	<.001	0.27	0.55	1.11	0.14	0.06	.03	0.02	0.27	1.11
Baseline PHQ-9	0.43	0.01	<.001	0.41	0.44	2.34	0.14	0.01	<.001	0.12	0.15	2.34
Baseline GAD-7	0.06	0.01	<.001	0.04	0.07	1.79	0.34	0.01	<.001	0.32	0.35	1.79
Baseline WSAS	0.09	0.01	<.001	0.08	0.10	1.64	0.06	0.004	<.001	0.05	0.07	1.64
Services (Block 3)												
Site A	-0.09	0.14	.52	-0.37	0.19	3.96	-0.11	0.12	.39	-0.35	0.14	3.93
Site B	0.94	0.14	<.001	0.66	1.22	3.46	0.80	0.13	<.001	0.56	1.05	3.45
Site D	-0.05	0.16	.76	-0.36	0.26	2.80	-0.06	0.14	.70	-0.33	0.22	2.81
Site E	-0.22	0.15	.16	-0.52	0.08	2.67	-0.20	0.14	.15	-0.46	0.07	2.68

Note: B = regression coefficient; SE = standard error; CI = confidence intervals; VIF = variance inflation factor; R^2 = total variance explained by the model; PHQ-9 Block 1 $R^2 = .05$; PHQ-9 Block 1+2 $R^2 = .32$; PHQ-9 Block 1+2+3 $R^2 = .32$; GAD-7 Block 1 $R^2 = .04$; GAD-7 Block 1+2 $R^2 = .28$; GAD-7 Block 1+2+3 $R^2 = .28$; Service C had the lowest mean IMD and was entered as a reference category.