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On poverty and trauma: Associations between neighbourhood socioeconomic deprivation with post-traumatic stress disorder severity and treatment response

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Conflicts of interest: TR wrote and receives royalties for the use of 'Space from Money Worries' an online CBT package developed by Silvercloud health designed to tackle the link between financial difficulties and mental health problems which is used in NHS Talking Therapies Services. TR is an advisor and shareholder for a company (TellJo) which identifies and supports those with financial vulnerability. JD has no conflicts of interest to declare.

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Abstract

Aims. To determine if neighbourhood socioeconomic deprivation is associated with post-traumatic stress disorder (PTSD) severity and psychological treatment response.

Methods. This was a retrospective cohort study based on the analysis of electronic health records for N=2064 patients treated for PTSD across 16 psychological therapy services in England. The *Revised Impact of Events Scale* (IES-R) scale was used to measure PTSD severity and associations were examined with the neighbourhood-level index of multiple deprivation (IMD) using non-parametric correlations and multilevel modelling.

Results. Three times more PTSD cases (33.6% vs. 9.7%) clustered within the most deprived IMD quintile compared to the least deprived quintile. A small and statistically significant correlation between IMD and IES-R baseline severity (r = -0.16, p < .001), indicated that patients living in the most deprived neighbourhoods had more severe symptoms. Post-treatment IES-R severity was also significantly associated with IMD (B = -0.74, p < .001), after controlling for baseline severity of PTSD and comorbid depression symptoms, and adjusting for between-service variability in treatment outcomes (ICC = 0.023). Treatment duration was a moderator of the association between IMD and treatment outcomes.

Conclusions. Neighbourhood deprivation is associated with a higher prevalence of PTSD, higher symptom severity at the start of treatment and poorer treatment response. A longer treatment duration mitigated the adverse impact of deprivation on treatment outcomes.

Key words: post-traumatic stress disorder; PTSD, CBT, EMDR, psychotherapy; socioeconomic deprivation; socioeconomic status, unemployment, poverty.

Highlights

- Most patients seeking psychological therapy for PTSD tended to live in socioeconomically deprived neighbourhoods.
- Patients living in deprived neighbourhoods had more severe symptoms of PTSD before therapy, compared to those living in more economically advantaged neighbourhoods.
- Patients living in deprived neighbourhoods also had poorer treatment response, unless they received lengthier interventions – which improves outcomes.

Introduction

Socioeconomic deprivation refers to a situation of scarcity and lower quality of life relative to general population norms. This is a multi-faceted concept proposed to encompass disadvantages related to factors such as education, employment, income, crime, access to services and the quality of housing and the living environment (Smith et al., 2015; Townsend, 1987). A large body of research has demonstrated a relationship between socioeconomic deprivation and mental health problems. For example, numerous empirical studies and reviews of this literature indicate that indices of socioeconomic deprivation are associated with the onset (Kivimäki et al., 2020), prevalence and severity of common mental health problems (Fryers et al., 2003; Silva et al., 2016). Several variables related to socioeconomic status have been found to be associated with depression and anxiety disorders, including economic recessions (Frasquilho et al., 2015), energy poverty (Bentley et al., 2023), debt (Richardson et al., 2013), the use of short-term loans (Sweet et al., 2018), financial strain (Dijkstra-Kersten et al., 2015), job insecurity and unemployment (Kim & von Dem Knesebeck, 2016). These convergent findings provide ample evidence that socioeconomic status is associated with depression and anxiety severity, although fewer studies have examined the socioeconomic correlates of other mental disorders.

Post-Traumatic Stress Disorder (PTSD) is a mental health problem characterised by symptoms such as flashbacks, nightmares, strong emotional reactions and avoidance of reminders of the trauma (World Health Organization, 2022). According to an analysis of the World Health Organization World Mental Health Surveys, the global lifetime prevalence of PTSD is 3.9% in the general population, with wide differences between countries (Koenen et al., 2017). This study indicates that low income is associated with higher rate of exposure to adverse events and higher lifetime prevalence of PTSD. Similarly, systematic reviews have suggested that lower socioeconomic status increases the risk of developing PTSD after earthquakes (Tang et al., 2017), and lower income increases the risk of PTSD following physical trauma (Visser et al., 2017). Neighbourhood poverty has been found to prospectively predict the incidence of PTSD following trauma exposure (Bhatt et al., 2017; George et

al., 2023; Ravi et al., 2023). An investigation of mental health in veterans found that those with mental health problems (including PTSD) tended to live in more deprived neighbourhoods (Murphy et al., 2017). Similarly, studies have shown increased risk of developing PTSD in crime victims with financial difficulties (van der Velden et al., 2023). A study in the United Kingdom found that unemployment was a risk factor for PTSD (McManus et al., 2016), though the World Health Organization found that across many countries socio-economic status did not predict PTSD (Kessler et al., 2017).

Trauma-focussed psychological interventions such as cognitive-behavioural therapy, cognitive processing therapy, eye-movement desensitisation and reprocessing (EMDR), are recommended first-line interventions for PTSD according to clinical guidelines (Martin et al., 2021). Although converging lines of evidence indicate that socioeconomic variables are associated with the incidence of PTSD, it is unclear whether socioeconomic deprivation may adversely impact treatment outcomes. An analysis of psychological therapy outcomes data from the English National Health Service (NHS) found that those who lived in socioeconomically deprived neighbourhoods had poorer psychological treatment outcomes (Finegan et al., 2020). Compared to patients living in more affluent neighbourhoods, those living in deprived neighbourhoods had higher mean levels of depression and anxiety symptom severity at the end of treatment, after controlling for baseline severity and other confounding variables. However, this study did not examine PTSD outcomes specifically. An individual patient data meta-analysis found that psychological therapies for PTSD were less effective for those who were unemployed (Wright et al., 2024). A more recent study including data from patients treated in the NHS found that neighbourhood deprivation was not associated with PTSD severity at the start of treatment, however those living in more deprived areas experienced less of a reduction in PTSD symptoms after treatment (Richardson et al., 2025). However, this study was based on a relatively small sample (N=138) from a single city. Such a restricted sample and geographical spread may limit the range of socioeconomic and cultural diversity, resulting in a more homogeneous sample by comparison to a multi-city study.

This study aimed to examine associations between socioeconomic deprivation, PTSD symptom severity and psychological treatment response. The study was designed to replicate and extend the work by Richardson et al. (2025) with a larger sample and across other geographical locations not included in the prior study. Three hypotheses were tested in the present study. We expected that [1] most patients referred for PTSD treatment would be living in deprived neighbourhoods. Furthermore, we expected that the gradient of socioeconomic deprivation would be linearly associated with PTSD severity [2] at pre-treatment intake assessment and [3] also post-treatment.

Method

Design and ethical approval

This retrospective cohort study was based on the analysis of routinely collected clinical care records from the National Health Service (NHS) in England. The assembly and analysis of this dataset was approved by the North East-Newcastle & North Tyneside NHS research ethics committee and the Health Research Authority (REC Reference: 15/LO/2200), and approved as a secondary data analysis by the University of Southampton ethics committee (reference 90598).

Setting, interventions and eligibility criteria

Electronic health records for patients who presented with symptoms of PTSD were collected from psychological services covering London, Yorkshire & Humber, Cambridgeshire, Cheshire and Lancashire. These services were part of the national *NHS Talking Therapies*[*] programme in England (Clark, 2011), which offers evidence-based psychological interventions for common mental health problems following clinical guidelines (National Institute for Health and Care Excellence, 2011). In accordance with these guidelines, patients with PTSD symptoms were offered up to 20 sessions of trauma-focused cognitive behavioural therapy (CBT), or eye-movement desensitisation and reprocessing (EMDR), delivered by qualified psychotherapists. Treatment assignment is usually made by the clinician who undertakes an initial assessment at the time when patients are referred to the

[*] *Note: NHS talking therapies services for anxiety and depression* is the current designation of the national treatment system formerly known as Improving Access to Psychological Therapies (IAPT).

service. The presence of PTSD symptoms is assessed via a semi-structured assessment interview and supplemented by a psychometric assessment (explained below). Following a shared decision-making process, the assessing clinician would briefly explain the available treatment options for PTSD and assign the patient based on their preference for CBT or EMDR.

This study included anonymised clinical and demographic data for a consecutive of sample of adult (aged ≥18) treatment seeking patients who presented with PTSD symptoms and whose treatment episode concluded within a 2-year data collection period.

Measures

The primary outcome of interest was PTSD symptom severity, which was measured using the Impact of Event Scale-Revised (IES-R; Weiss, 2007). This is a 22-item questionnaire that measures typical symptoms of PTSD clustered into three domains: intrusion (8 items), hyperarousal (6 items), avoidance (8 items). Items are scored using a 5-point Likert scale denoting distress (0-4), yielding a sum score between 0 and 88. The scale has been found to have high internal consistency (Cronbach's alpha=0.96), good convergent validity (r = 0.84 correlation with the PTSD Checklist), and adequate sensitivity (0.91) and specificity (0.82) to screen for a probable diagnosis of PTSD using a cut-off ≥33 (Creamer et al., 2003). A reliable change index of ≥9 points has been recommended as an indication of statistically reliable change that is unlikely to be solely due to measurement error (NHS England, 2014).

Socioeconomic deprivation was measured using the Index of Multiple Deprivation (IMD; Smith et al., 2015), which ranks neighbourhoods in England from the most to the least deprived, based on seven area-level indicators: income, unemployment, education level, health and disability, crime, barriers to housing and services, and quality of the local environment. IMD scores can be clustered into deciles (where 1= most deprived, 10= least deprived areas), representing relative neighbourhood deprivation levels using an ordinal variable. Neighbourhoods were defined using the UK government concept of a Lower Layer Super Output Area (LSOA), each approximating 1,500 residents or 650 households (Ministry of Housing, Communities & Local Government, 2019).

Additional data sources included demographic characteristics (age, gender, ethnicity, employment status; described below). Depression symptoms were assessed using the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001), where each of nine items is rated on a 0 – 3 Likert scale denoting symptom frequency in the last two weeks, yielding an overall severity score between 0 and 27. Anxiety symptoms were assessed using the Generalized Anxiety Disorder questionnaire (GAD-7; Spitzer et al., 2006), where each of seven items is rated on a 0 – 3 Likert scale yielding an overall severity score between 0 and 21. Functional impairment was assessed using the Work and Social Adjustment Scale (WSAS; Mundt et al. 2002) which rates functioning across five domains: work, home management, social life, private leisure activities, and family relationships. A severity score is derived from the sum of five Likert scales (0 to 8), yielding a functional impairment score between 0 and 40. Psychometric measures listed above were collected by clinicians as part of a standard routine outcome monitoring process (Clark, 2011); only intake and last-observed measures were collected as part of this study database.

Sample selection and characteristics

The study sample included clinical records for patients who [1] were screened for PTSD using the IES-R scale at their initial assessment, [2] were deemed eligible for psychological therapy in this setting, [3] attended at least 1 session of trauma-focused therapy (either CBT or EMDR) after the intake assessment, [4] had been discharged by the service by the time of data collection. Records for patients who completed treatment and those who dropped out were included in analysis, following intention-to-treat principles. Patients completed session-by-session outcome measures, and therefore the last-observed measure was carried forward to evaluate the final treatment outcome for all cases irrespective of whether they completed their agreed intervention or dropped out of care. Pseudonymised identifiers were available for all participating services to control for systematic differences in treatment outcomes across treatment sites. The dataset of eligible cases that met the above criteria included records for N=2064 patients treated across 16 services.

Caseload size across services ranged from 48 to 281; mean=129.00 (SD=62.30). In the full

sample, the mean age was 39.13 (SD=13.02), 60.2% were females, and 81.3% were from a White British background (Black=8.2%, South Asian=6.3%, multi-racial=2.5%, Chinese=0.2, other=1.4). Approximately 37.9% were unemployed. Mean (SD) baseline psychometric scores were IES-R=60.61 (16.88), PHQ-9=17.48 (5.73), GAD-7=15.62 (4.50), WSAS=22.86 (10.01). Analysis of the primary outcome measure indicated that 93.3% of patients had PTSD severity in the clinical range (IES-R ≥ 33) at the time of intake assessment. In addition, 90.3% had comorbid case-level depression (PHQ-9 ≥ 10) and 93.2% had comorbid anxiety (GAD-7 ≥ 8) symptoms. A breakdown of sample characteristics per each service is available in Supplemental Materials.

Statistical analysis

Treatment outcomes. Treatment outcomes were summarised in two ways. First, pre-post treatment (within group) effect sizes were calculated across all available measures following guidance by Minami et al. (2008). Next, the proportion of cases that attained full remission of PTSD symptoms was calculated, based on the concept of reliable and clinically significant improvement (RCSI) proposed by Jacobson and Truax (1992). To be classed as RCSI, a patient who had case-level PTSD symptoms (IES-R ≥ 33) at intake: [1] improved by a magnitude greater or equal to the reliable change index (≥9 points), and [2] had sub-clinical symptoms (IES-R < 33) at the last observed treatment appointment. Missing post-treatment IES-R measures were dealt with using multiple imputation by chained equations, leveraging information from available secondary measures.

Associations between neighbourhood deprivation and PTSD. First, we examined the distribution of PTSD cases across IMD decile groups statistically using a one-sample Wald test. Next, mean levels of baseline IES-R severity across IMD decile groups were plotted on a graph and a non-parametric correlation was calculated, treating IMD as an ordinal variable based on graphical evidence of linear associations.

Next, we used multilevel modelling (MLM) to examine associations between IMD and post-treatment IES-R scores, controlling for systematic variability between services, and adjusting for intake IES-R and PHQ-9 severity. Given the strong correlations between IES-R and GAD-7, and the use of GAD-7 to impute missing IES-R data points, the GAD-7 was not included in the regression model to reduce

multicollinearity and to improve model fit. The model structure included patient-level data (level 1) nested within services (level 2), including random intercepts for the service level. Following conventional model-building guidelines (Raudenbush 2002), continuous predictors were grand mean-centred and MLM was performed in iterative steps, starting with single-level models and eventually fitting multi-level and covariate-adjusted models that optimized goodness-of-fit. Model fit was examined after each modelling step, using the -2 loglikelihood ratio, BIC and AIC indices. The intracluster correlation coefficient (ICC) was calculated to estimate the proportion of variance attributable to the service-level.

Sensitivity analyses repeated the above MLM entering additional variables sequentially in two steps. The first step added employment status and ethnicity as potential confounders. The second step included a main effect for the number of attended therapy sessions and an interaction between IMD and sessions (a moderator analysis). Finally, we graphically examined mean post-treatment IES-R severity and the percentage of patients attaining RCSI across all IMD deciles. Analyses were conducted using IBM SPSS version 29.

Results

Treatment outcomes

Large pre-post treatment effect sizes were observed across all available symptom domains, including PTSD (*d*= 1.48; 95% CI 1.40–1.55), depression (*d*= 1.14; 1.07–1.21), and anxiety (*d*= 1.29; 1.22–1.36). A moderate effect size was observed in the measure of work and social adjustment (*d*= 0.70; 0.64–0.77). Of those who had case-level PTSD symptoms at intake (N=1926), 48.1% met criteria for RCSI at the end of their treatment episode.

Associations between neighbourhood deprivation and PTSD

As shown in Figure 1, the density of PTSD cases across IMD deciles was skewed toward more socioeconomically deprived neighbourhoods, with more than three times more cases (33.6% vs. 9.7%) clustered within the most deprived quintile compared to the least deprived quintile. Results of the Wald test indicated that the distribution of PTSD cases across IMD deciles is not even (Wald Z= -99.03,

SE= .01, $p < .001$). Figure 2 shows a clearly linear and inverse relationship between IMD and IES-R baseline severity (r= -0.16, p < .001), indicating that patients living in the most deprived neighbourhoods (lower IMD decile) also had more severe PTSD symptoms at the start of treatment.

The fully adjusted MLM analysis is displayed in Table 1. All fixed effects in the model were statistically significant ($p < .001$) and together explained 16.2% of variance in PTSD treatment outcomes. The negative regression coefficient for IMD (B= -0.74) indicates an inverse association, such that lower than average IMD deciles (i.e., more socioeconomically deprived) were associated with higher PTSD severity at the end of treatment. Positive coefficients for the other two variables in the model indicate that higher baseline depression and PTSD symptom severity was associated with higher post-treatment PTSD severity. The model also indicated systematic variability in PTSD treatment outcomes between services, as the random effect explained approximately 2.3% of variance (ICC= .023).

Figure 3 illustrates these results graphically, showing that patients living in the least deprived neighbourhoods (IMD deciles ≥5) tended to have mean levels of post-treatment PTSD symptoms in the sub-clinical range (below the cut-off of 33) and higher rates of RCSI compared to those in the most deprived neighbourhoods. Comparison between the most and least deprived groups shows a mean difference of 9.2 points in the IES-R scale (equivalent a between-groups effect size of d = .39) and a difference of 15.6% in RCSI rates.

The same pattern of results was observed in the first step of the sensitivity analysis, where the effect of IMD remained statistically significant (B = -0.40, SE= 0.21, p = .049) after controlling for employment status and ethnicity. The second step and fully adjusted sensitivity analysis is presented in Table 2. In this model, IMD is no longer statistically significant (B = -0.29, SE = 0.20, $p < .156$) after including regression terms for treatment sessions and an IMD-by-sessions interaction, both of which were statistically significant ($p < .01$). In this model, being unemployed was significantly associated with poorer treatment outcomes, but being from an ethnic minority was not.

Discussion

This study aimed to examine associations between socioeconomic deprivation and PTSD symptom severity before and after exposure to psychological therapy. Consistent with our first hypothesis, the findings indicate that treatment-seeking patients with PTSD in England are more likely to live in socioeconomically deprived neighbourhoods. This is in line with previous research in England demonstrating that more deprived areas have a greater need for psychological therapies for depression and anxiety (Delgadillo et al., 2016) and epidemiological research suggesting lower socioeconomic status increases the risk of developing PTSD (Tang et al., 2017). However, it should be noted that this study did not examine the deprivation rates in the PTSD treatment-seeking sample in comparison to the deprivation spread for the service geographical catchment areas as whole.

In line with our second hypothesis, those from more deprived areas started therapy with more severe PTSD symptoms. This is in contrast to findings from a single-city sample from a similar treatment setting, which showed no such association (Richardson et al., 2025). This may be because of the larger sample size and greater geographical spread with more socioeconomic variability in the current sample. The current findings are also in line with epidemiological research showing that lower income is associated with more severe PTSD symptoms following traumatic incidents (Shiga et al., 2021).

The current study also suggests that those from more deprived areas experienced less of a reduction in PTSD symptom severity post-treatment, supporting our third hypothesis. In the current sample there was considerable variation in recovery rates based on deprivation. This held after adjusting for differences between services, baseline severity of PTSD, comorbid depression symptoms, employment status and ethnicity. Thus, poorer treatment outcomes in patients from deprived areas are not merely explained by higher baseline severity and are not confounded by ethnic diversity. This is in line with a previous study showing smaller reduction in PTSD symptoms after treatment for those living in more deprived areas (Richardson et al., 2025), and in line with a previous analysis of

depression and anxiety symptoms in NHS talking therapies (Finegan et al., 2020). Unemployment was also found to be an independent predictor of poorer outcomes from trauma therapy, consistent with a previous meta-analysis of outcomes for outcomes from EMDR specifically (Wright et al., 2024). Moreover, sensitivity analyses indicate that the number of therapy sessions moderates the relationship between socioeconomic deprivation and treatment outcomes. In other words, patients living in deprived neighbourhoods generally have poorer treatment outcomes, unless they receive longer treatments – in which case outcomes improve. We note that a small proportion (~2%) of variance in treatment outcomes was explained by differences between services. It is plausible that these differences are explained by systematic differences in treatment duration policies applied in different services, as evidenced by the wide variability in the mean number of treatment sessions across services (see Supplemental Appendix) ranging from 7.81 to 15.27.

The exact mechanisms for this relationship are unclear. It is unlikely that this association may be explained by treatment dropout, since meta-analytic evidence examining associations between socioeconomic deprivation and dropout does not indicate a statistically significant relationship (Firth et al., 2022). This relationship is not confounded by ethnic diversity either, so cultural adaptations to therapy may not necessarily improve outcomes for patients living in socioeconomically deprived neighbourhoods. It may be that those from poorer neighbourhoods live in high crime areas and are therefore more likely to be exposed to traumatic incidents such as violence. In London, for example, the poorest 10% of areas has more than double the rates of robbery, violent and sexual crimes than the richest 10% (Trust for London, 2023), and research has shown that lower parental education increases the risk of exposure to childhood sexual abuse (Martin et al., 2011). This may explain the observation that many PTSD treatment seeking patients come from the most deprived neighbourhoods, and with highly severe symptoms prior to starting treatment. Richardson et al. (2025) have discussed the possibility that those in deprived areas could be exposed to recurring threats (e.g., antisocial behaviour, crime) and may not feeling safe during therapy, thus requiring

longer treatments to gain trust in the therapist and the therapy process. However future research is required to explore this in detail and to guide contextually responsive care.

Strengths and limitations

This naturalistic cohort study included psychometrically validated outcome measures for over 2000 patients treated across geographically and socioeconomically diverse areas in England. Patients included in the sample lived in neighbourhoods that represented all gradients of socioeconomic deprivation, with large sample sizes in each decile group, enabling the investigation of deprivation-outcome associations with adequate statistical power. Furthermore, the proportion of patients from ethnic minorities in this sample (18.7%) is consistent with general population norms in England (Office of National Statistics, 2022).

A limitation of the current study is that the diagnosis of PTSD for patients treated in this setting was not formally derived from structured diagnostic interviews, and hence there is some uncertainty about the precision of the sample selection. Nevertheless, the IES-R measure applied to establish case-level symptoms has been found to be a reliable case-finding tool for PTSD. Data on the specific treatment that patients were referred to after assessments (CBT or EMDR) were not available for analysis, although the majority would have been offered CBT as this is a commonly available first line intervention in this setting (Clark, 2011). Hence, we were unable to carry out treatment-specific analyses of treatment response. Moreover, more detailed socioeconomic indicators such as income or education level were not available.

Future research is necessary to understand why patients living in socioeconomically deprived neighbourhoods benefit less from evidence-based trauma-focused therapies, and what adaptations could help to rectify this disparity – aside from lengthier interventions which result in better outcomes. For example, referring to money and debt advice organisations could be helpful: The Money and Mental Health Policy Institute has called for close integration between NHS Talking Therapies and money advice during the cost of living crisis (Bond, 2023). Overall, the present study provides evidence

that socioeconomic deprivation is associated with more severe PTSD symptoms and poorer treatment response, although longer treatments could help to improve clinical outcomes.

Figure 1. Distribution of treatment-seeking PTSD cases according to socioeconomic deprivation

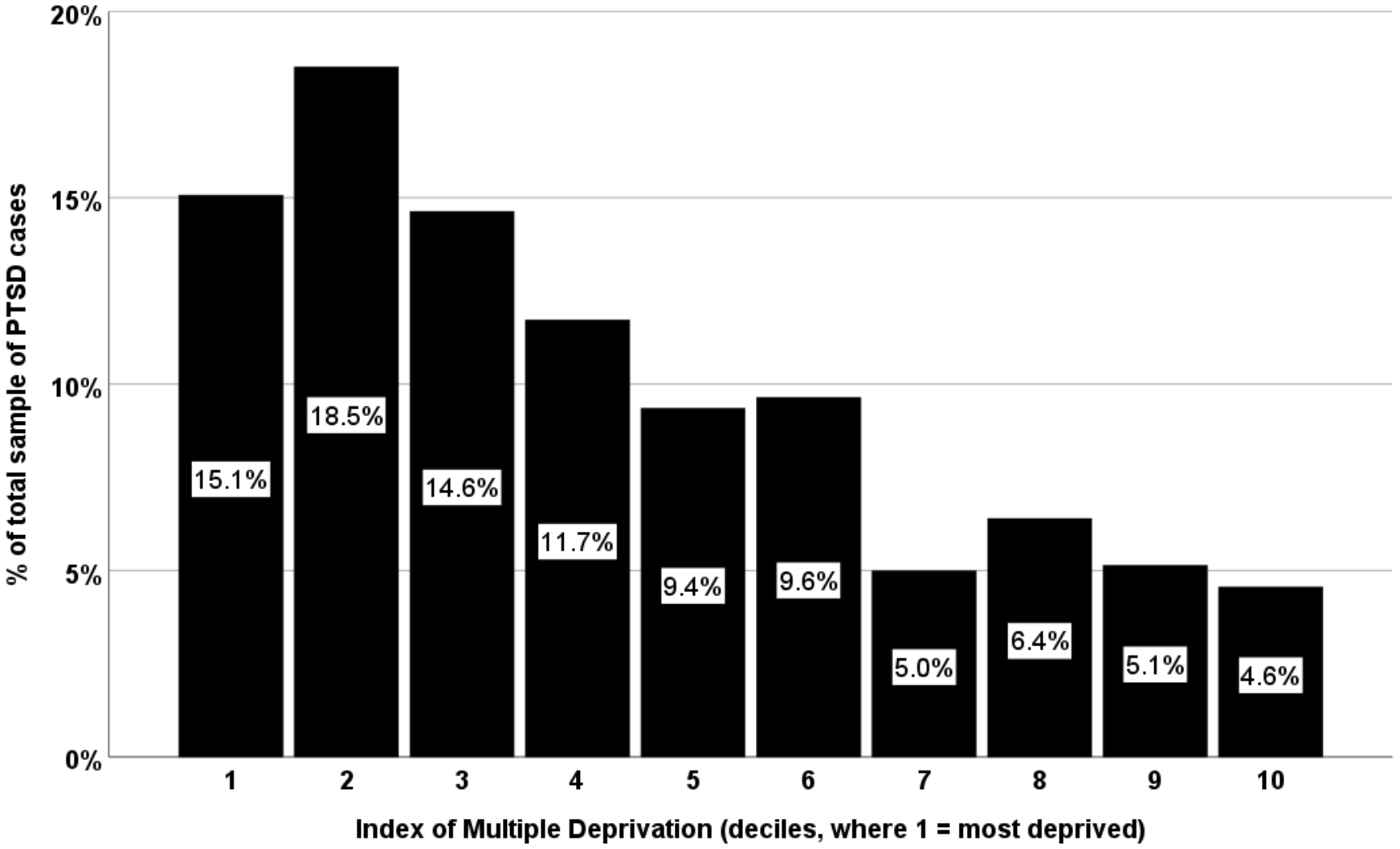

Figure 2. Associations between baseline (pre-treatment) PTSD symptom severity and socioeconomic deprivation

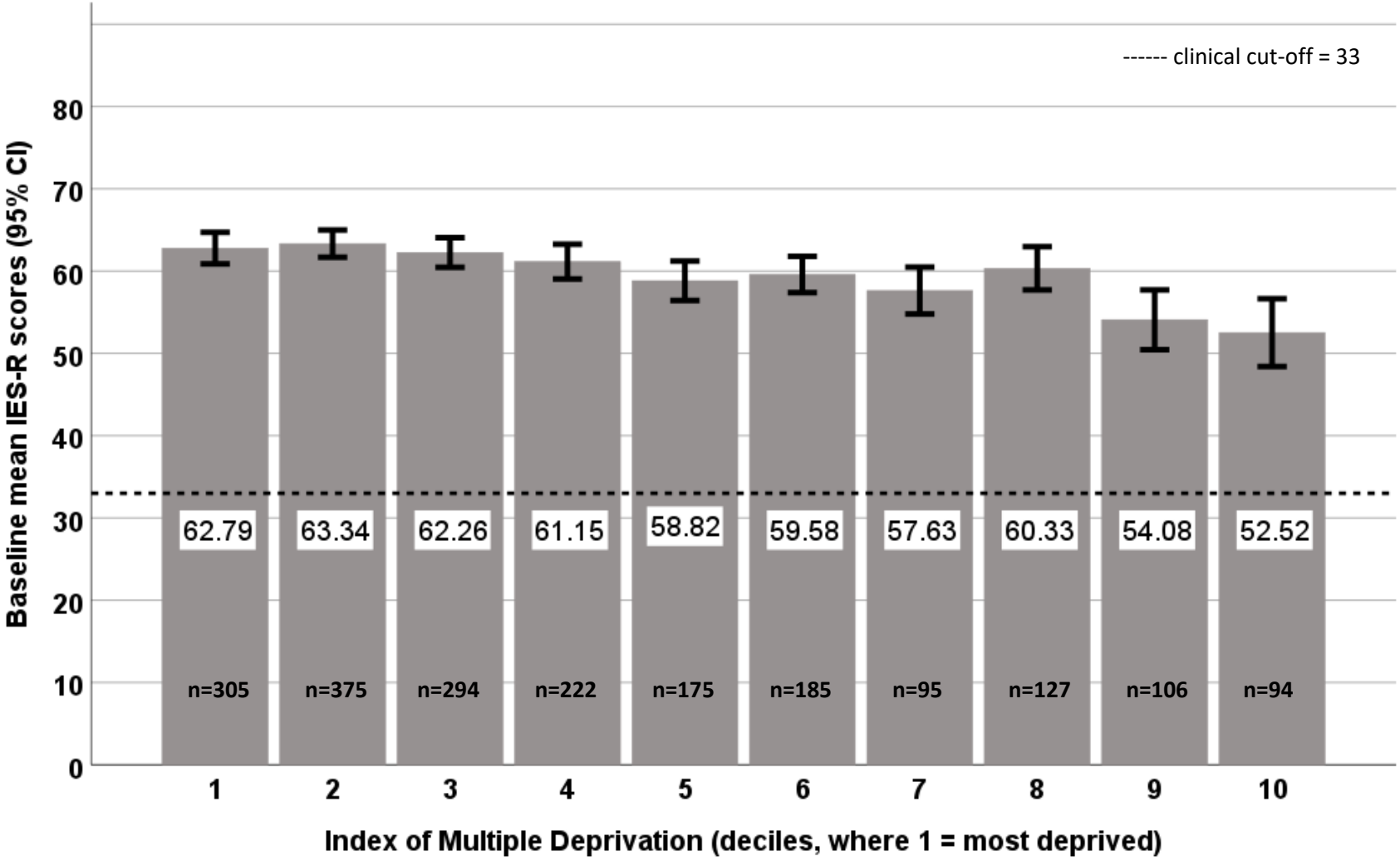

Figure 3. Associations between post-treatment PTSD outcomes and socioeconomic deprivation

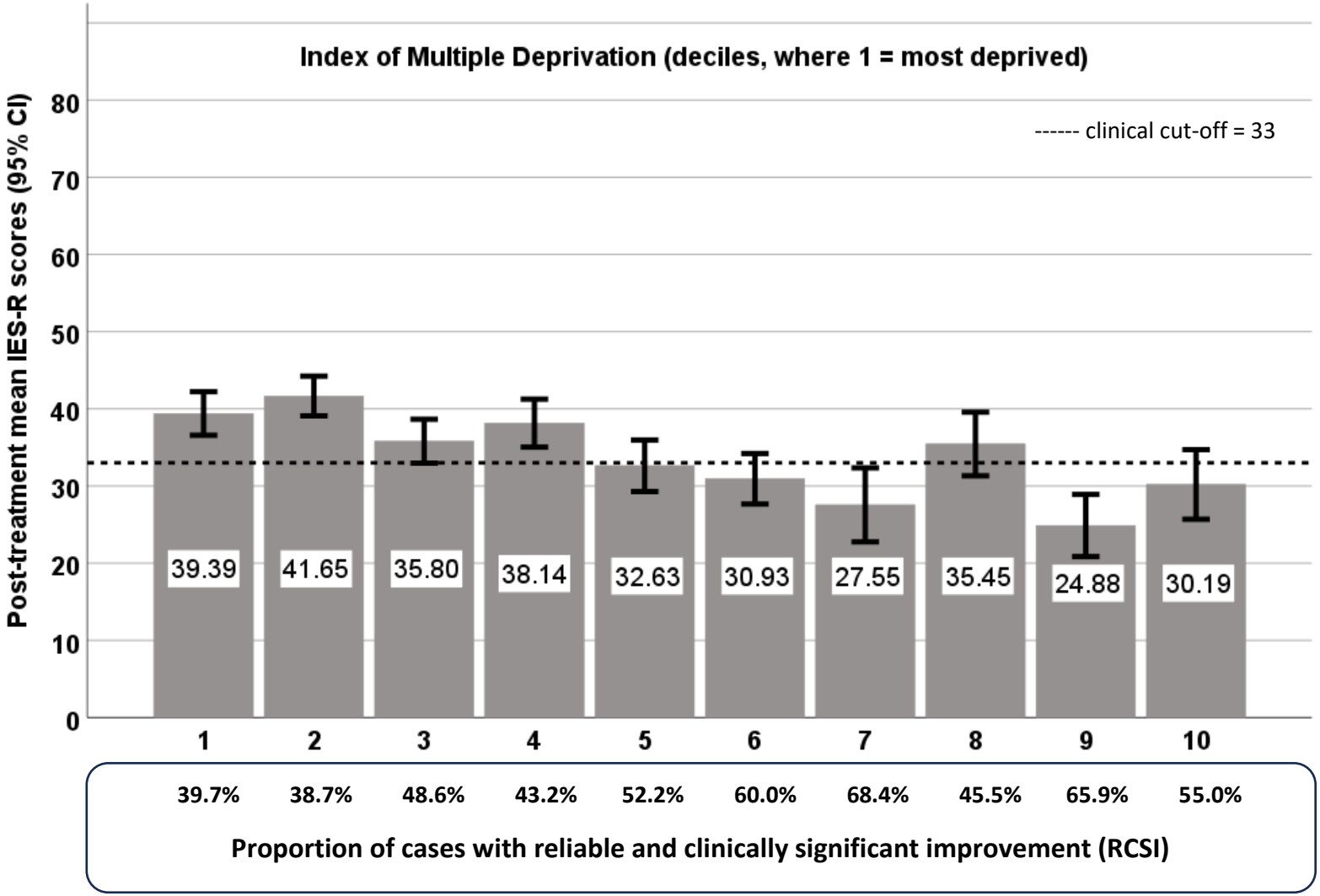

Table 1. Main effects of fully-adjusted multilevel model predicting post-treatment PTSD severity

Fixed effects							
Variables	**B**	**SE**	**t**	***p***	**CI-low**	**Ci-high**	
Intercept	35.256	1.013	34.801	<.001	33.270	37.243	
Baseline IES-R (mc)	0.413	0.032	12.780	<.001	0.349	0.476	
Baseline PHQ-9 (mc)	0.723	0.096	7.561	<.001	0.536	0.911	
IMD decile (mc)	-0.739	0.205	-3.600	<.001	-1.142	-0.336	
Covariance parameters							
Effects	**Variance**	**SE**	**Z**	***p***	**CI-low**	**Ci-high**	**ICC**
Residual effect	506.127	15.824	31.984	<.001	476.043	538.112	-
Random effect (services)	11.669	5.826	2.003	.045	4.386	31.047	0.023

B = regression coefficient; SE = standard error; CI = 95% confidence intervals; mc = mean centred; PTSD = post-traumatic stress disorder; IES-R = revised impact of events scale (PTSD severity); PHQ-9 = patient health questionnaire (depression severity); IMD = index of multiple deprivation (deciles, where 1 = most deprived neighbourhoods); ICC = intracluster correlation coefficient; -2 log likelihood = 18734.034; Akaike information criterion (AIC) = 18738.039; Bayesian information criterion (BIC) = 18749.295; marginal R-square (variance explained by fixed effects) = .162

Table 2. Sensitivity analysis

Fixed effects							
Variables	**B**	**SE**	**t**	***p***	**CI-low**	**Ci-high**	
Intercept	31.372	1.2089	25.950	<.001	29.001	33.743	31.372
Baseline IES-R (mc)	.383	.0311	12.308	<.001	.322	.444	.383
Baseline PHQ-9 (mc)	.586	.0936	6.266	<.001	.403	.770	.586
IMD decile (mc)	-.286	.2016	-1.419	.156	-.681	.109	-.286
Unemployed	8.671	1.0552	8.217	<.001	6.601	10.740	8.671
Minority ethnic group	2.532	1.3611	1.860	.063	-.138	5.201	2.532
Sessions (mc)	-.717	.0676	-10.608	<.001	-.850	-.585	-.717
IMD * sessions (interaction)	.075	.0236	3.177	.002	.029	.121	.075
Covariance parameters							
Effects	**Variance**	**SE**	**Z**	***p***	**CI-low**	**Ci-high**	**ICC**
Residual effect	461.751	14.451	31.954	<.001	434.279	490.960	-
Random effect (services)	15.553	7.067	2.201	.028	6.384	37.896	0.033

B = regression coefficient; SE = standard error; CI = 95% confidence intervals; mc = mean centred; PTSD = post-traumatic stress disorder; IES-R = revised impact of events scale (PTSD severity); PHQ-9 = patient health questionnaire (depression severity); IMD = index of multiple deprivation (deciles, where 1 = most deprived neighbourhoods); ICC = intracluster correlation coefficient; -2 log likelihood = 18550.079; Akaike information criterion (AIC) = 18554.084; Bayesian information criterion (BIC) = 18565.336; marginal R-square (variance explained by fixed effects) = .236

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On poverty and trauma: Associations between neighbourhood socioeconomic deprivation with post-traumatic stress disorder severity and treatment response

Supplemental Materials

Sample characteristics across all participating NHS Trusts (anonymized)

Table S1. Continuous variables

Service			IMD decile (1 = most deprived)	Age at referral	PHQ9_first	GAD7_first	WSAS_first	Number of Attended Contacts
A	N	Valid	150	150	150	150	150	150
	Mean		3.19	37.51	18.19	15.43	21.59	11.28
	Std. Deviation		2.365	13.303	5.584	4.924	10.129	7.143
	Minimum		1	16	3	3	0	2
	Maximum		10	76	27	21	40	38
B	N	Valid	187	187	187	187	187	187
	Mean		5.84	40.06	15.87	14.79	23.17	11.63
	Std. Deviation		2.603	12.959	6.186	4.756	10.234	6.249
	Minimum		1	17	0	1	0	2
	Maximum		10	70	27	21	40	26
C	N	Valid	173	173	173	173	173	173
	Mean		5.80	40.94	16.86	15.41	18.90	15.27
	Std. Deviation		2.933	13.962	6.345	4.705	9.954	12.965
	Minimum		1	17	0	0	0	2
	Maximum		10	73	27	21	40	91
D	N	Valid	86	86	86	86	86	86
	Mean		5.33	39.02	17.85	15.27	21.26	11.88
	Std. Deviation		2.859	12.983	5.812	4.938	9.564	7.400
	Minimum		1	16	0	0	0	2
	Maximum		10	65	27	21	39	34
E	N	Valid	42	42	42	42	42	42
	Mean		4.45	40.79	15.69	15.93	22.79	9.98
	Std. Deviation		2.743	12.401	5.177	4.960	10.299	5.039
	Minimum		1	18	5	1	0	2
	Maximum		10	71	27	21	37	19
F	N	Valid	166	166	166	166	166	166
	Mean		5.81	40.47	16.47	15.56	21.23	10.54
	Std. Deviation		2.763	13.458	5.666	4.177	9.724	5.600
	Minimum		1	18	2	5	0	2
	Maximum		10	68	27	21	40	31
G	N	Valid	281	281	281	281	281	281
	Mean		3.40	36.79	17.44	15.31	23.44	10.32
	Std. Deviation		2.032	12.847	5.654	4.589	9.784	6.032
	Minimum		1	16	1	2	0	2
	Maximum		10	69	27	21	40	42
H	N	Valid	159	159	159	159	159	159
	Mean		2.53	37.39	18.40	16.53	26.38	10.51
	Std. Deviation		1.018	12.551	5.289	3.716	8.969	6.954
	Minimum		1	18	4	3	0	2
	Maximum		8	68	27	21	40	49
I	N	Valid	96	96	96	96	96	96

	Mean	5.11	39.97	16.33	15.47	19.75	10.43
	Std. Deviation	2.357	13.340	5.457	4.267	9.053	4.595
	Minimum	1	19	3	3	0	2
	Maximum	10	73	27	21	38	27
J	N Valid	34	34	34	34	34	34
	Mean	4.56	35.68	18.71	17.03	23.74	14.24
	Std. Deviation	1.845	12.004	6.123	4.352	12.094	5.990
	Minimum	2	18	2	4	0	3
	Maximum	9	64	27	21	40	29
K	N Valid	131	131	131	131	131	131
	Mean	3.04	39.37	17.96	15.74	27.24	12.34
	Std. Deviation	1.344	12.823	5.040	4.344	8.940	8.492
	Minimum	1	17	3	4	0	2
	Maximum	6	70	27	21	40	33
L	N Valid	128	128	128	128	128	128
	Mean	4.20	40.97	16.74	14.83	21.96	7.81
	Std. Deviation	2.501	12.991	5.695	4.499	9.722	5.581
	Minimum	1	17	2	5	0	2
	Maximum	9	66	26	21	40	35
M	N Valid	48	48	48	48	48	48
	Mean	3.04	39.83	18.13	16.81	25.67	8.75
	Std. Deviation	2.123	13.678	5.131	3.636	8.208	5.719
	Minimum	1	17	6	7	6	2
	Maximum	8	68	26	21	38	23
N	N Valid	102	102	102	102	102	102
	Mean	3.69	41.14	18.60	15.98	23.06	11.07
	Std. Deviation	2.610	13.506	5.254	4.540	10.421	6.432
	Minimum	1	17	5	3	0	2
	Maximum	9	72	27	21	40	38
O	N Valid	143	143	143	143	143	143
	Mean	4.54	37.90	18.68	15.89	22.48	8.91
	Std. Deviation	3.130	12.100	5.829	4.502	10.464	4.616
	Minimum	1	16	2	1	0	2
	Maximum	10	76	27	21	40	26
P	N Valid	138	138	138	138	138	138
	Mean	3.51	39.99	18.67	16.36	24.33	10.98
	Std. Deviation	2.334	11.923	5.537	4.205	8.727	5.853
	Minimum	1	17	2	3	2	2
	Maximum	10	69	27	21	40	29

Table S2. Self-reported gender

Service			Frequency	Percent	Valid Percent	Cumulative Percent
A	Valid	Male	61	40.7	40.7	40.7
		Female	89	59.3	59.3	100.0
		Total	150	100.0	100.0	
B	Valid	Male	87	46.5	46.5	46.5
		Female	100	53.5	53.5	100.0
		Total	187	100.0	100.0	
C	Valid	Male	63	36.4	36.4	36.4
		Female	110	63.6	63.6	100.0
		Total	173	100.0	100.0	
D	Valid	Male	37	43.0	43.0	43.0
		Female	49	57.0	57.0	100.0
		Total	86	100.0	100.0	
E	Valid	Male	16	38.1	38.1	38.1
		Female	26	61.9	61.9	100.0
		Total	42	100.0	100.0	
F	Valid	Male	59	35.5	35.5	35.5
		Female	107	64.5	64.5	100.0
		Total	166	100.0	100.0	
G	Valid	Male	104	37.0	37.3	37.3
		Female	175	62.3	62.7	100.0
		Total	279	99.3	100.0	
	Missing	System	2	.7		
	Total		281	100.0		
H	Valid	Male	63	39.6	39.6	39.6
		Female	96	60.4	60.4	100.0
		Total	159	100.0	100.0	
I	Valid	Male	29	30.2	30.2	30.2
		Female	67	69.8	69.8	100.0
		Total	96	100.0	100.0	
J	Valid	Male	15	44.1	44.1	44.1
		Female	19	55.9	55.9	100.0
		Total	34	100.0	100.0	
K	Valid	Male	59	45.0	45.0	45.0
		Female	72	55.0	55.0	100.0
		Total	131	100.0	100.0	
L	Valid	Male	53	41.4	41.4	41.4
		Female	75	58.6	58.6	100.0
		Total	128	100.0	100.0	
M	Valid	Male	21	43.8	43.8	43.8
		Female	27	56.3	56.3	100.0
		Total	48	100.0	100.0	
N	Valid	Male	43	42.2	42.2	42.2
		Female	59	57.8	57.8	100.0
		Total	102	100.0	100.0	
O	Valid	Male	58	40.6	40.6	40.6

		Female	85	59.4	59.4	100.0
		Total	143	100.0	100.0	
P	Valid	Male	53	38.4	38.4	38.4
		Female	85	61.6	61.6	100.0
		Total	138	100.0	100.0	

Table S3. Self-reported ethnicity

Service			Frequency	Percent	Valid Percent	Cumulative Percent
A	Valid	White	143	95.3	97.9	97.9
		Asian	2	1.3	1.4	99.3
		Black	1	.7	.7	100.0
		Total	146	97.3	100.0	
	Missing	System	4	2.7		
	Total		150	100.0		
B	Valid	White	159	85.0	95.2	95.2
		Multi-racial	2	1.1	1.2	96.4
		Asian	2	1.1	1.2	97.6
		Black	3	1.6	1.8	99.4
		Other	1	.5	.6	100.0
		Total	167	89.3	100.0	
	Missing	System	20	10.7		
	Total		187	100.0		
C	Valid	White	167	96.5	98.2	98.2
		Multi-racial	1	.6	.6	98.8
		Asian	1	.6	.6	99.4
		Chinese	1	.6	.6	100.0
		Total	170	98.3	100.0	
	Missing	System	3	1.7		
	Total		173	100.0		
D	Valid	White	85	98.8	98.8	98.8
		Black	1	1.2	1.2	100.0
		Total	86	100.0	100.0	
E	Valid	White	39	92.9	97.5	97.5
		Multi-racial	1	2.4	2.5	100.0
		Total	40	95.2	100.0	
	Missing	System	2	4.8		
	Total		42	100.0		
F	Valid	White	159	95.8	97.5	97.5
		Asian	1	.6	.6	98.2
		Black	1	.6	.6	98.8
		Chinese	1	.6	.6	99.4
		Other	1	.6	.6	100.0
		Total	163	98.2	100.0	
	Missing	System	3	1.8		
	Total		166	100.0		

G	Valid	White	142	50.5	52.2	52.2
		Multi-racial	21	7.5	7.7	59.9
		Asian	26	9.3	9.6	69.5
		Black	72	25.6	26.5	96.0
		Chinese	1	.4	.4	96.3
		Other	10	3.6	3.7	100.0
		Total	272	96.8	100.0	
	Missing	System	9	3.2		
	Total		281	100.0		
H	Valid	White	93	58.5	58.5	58.5
		Multi-racial	4	2.5	2.5	61.0
		Asian	24	15.1	15.1	76.1
		Black	34	21.4	21.4	97.5
		Other	4	2.5	2.5	100.0
		Total	159	100.0	100.0	
I	Valid	White	80	83.3	83.3	83.3
		Asian	5	5.2	5.2	88.5
		Black	9	9.4	9.4	97.9
		Chinese	1	1.0	1.0	99.0
		Other	1	1.0	1.0	100.0
		Total	96	100.0	100.0	
J	Valid	White	16	47.1	47.1	47.1
		Asian	14	41.2	41.2	88.2
		Black	4	11.8	11.8	100.0
		Total	34	100.0	100.0	
K	Valid	White	68	51.9	52.3	52.3
		Multi-racial	7	5.3	5.4	57.7
		Asian	25	19.1	19.2	76.9
		Black	27	20.6	20.8	97.7
		Other	3	2.3	2.3	100.0
		Total	130	99.2	100.0	
	Missing	System	1	.8		
	Total		131	100.0		
L	Valid	White	106	82.8	84.8	84.8
		Multi-racial	4	3.1	3.2	88.0
		Asian	7	5.5	5.6	93.6
		Black	4	3.1	3.2	96.8
		Other	4	3.1	3.2	100.0
		Total	125	97.7	100.0	
	Missing	System	3	2.3		
	Total		128	100.0		
M	Valid	White	41	85.4	91.1	91.1
		Asian	2	4.2	4.4	95.6
		Black	1	2.1	2.2	97.8
		Other	1	2.1	2.2	100.0
		Total	45	93.8	100.0	
	Missing	System	3	6.3		
	Total		48	100.0		
N	Valid	White	83	81.4	86.5	86.5
		Multi-racial	1	1.0	1.0	87.5

		Asian	8	7.8	8.3	95.8
		Black	3	2.9	3.1	99.0
		Other	1	1.0	1.0	100.0
		Total	96	94.1	100.0	
	Missing	System	6	5.9		
	Total		102	100.0		
O	Valid	White	97	67.8	88.2	88.2
		Multi-racial	7	4.9	6.4	94.5
		Asian	4	2.8	3.6	98.2
		Other	2	1.4	1.8	100.0
		Total	110	76.9	100.0	
	Missing	System	33	23.1		
	Total		143	100.0		
P	Valid	White	111	80.4	96.5	96.5
		Multi-racial	1	.7	.9	97.4
		Asian	2	1.4	1.7	99.1
		Black	1	.7	.9	100.0
		Total	115	83.3	100.0	
	Missing	System	23	16.7		
	Total		138	100.0		

Table S4. Employment status

Service			**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
A	Valid	All others	81	54.0	54.0	54.0
		Unemployed	69	46.0	46.0	100.0
		Total	150	100.0	100.0	
B	Valid	All others	147	78.6	78.6	78.6
		Unemployed	40	21.4	21.4	100.0
		Total	187	100.0	100.0	
C	Valid	All others	120	69.4	69.4	69.4
		Unemployed	53	30.6	30.6	100.0
		Total	173	100.0	100.0	
D	Valid	All others	59	68.6	68.6	68.6
		Unemployed	27	31.4	31.4	100.0
		Total	86	100.0	100.0	
E	Valid	All others	32	76.2	76.2	76.2
		Unemployed	10	23.8	23.8	100.0
		Total	42	100.0	100.0	
F	Valid	All others	119	71.7	71.7	71.7
		Unemployed	47	28.3	28.3	100.0
		Total	166	100.0	100.0	
G	Valid	All others	145	51.6	51.6	51.6
		Unemployed	136	48.4	48.4	100.0

		Total	281	100.0	100.0	
H	Valid	All others	91	57.2	57.2	57.2
		Unemployed	68	42.8	42.8	100.0
		Total	159	100.0	100.0	
I	Valid	All others	66	68.8	68.8	68.8
		Unemployed	30	31.3	31.3	100.0
		Total	96	100.0	100.0	
J	Valid	All others	21	61.8	61.8	61.8
		Unemployed	13	38.2	38.2	100.0
		Total	34	100.0	100.0	
K	Valid	All others	74	56.5	56.5	56.5
		Unemployed	57	43.5	43.5	100.0
		Total	131	100.0	100.0	
L	Valid	All others	78	60.9	60.9	60.9
		Unemployed	50	39.1	39.1	100.0
		Total	128	100.0	100.0	
M	Valid	All others	26	54.2	54.2	54.2
		Unemployed	22	45.8	45.8	100.0
		Total	48	100.0	100.0	
N	Valid	All others	60	58.8	58.8	58.8
		Unemployed	42	41.2	41.2	100.0
		Total	102	100.0	100.0	
O	Valid	All others	79	55.2	55.2	55.2
		Unemployed	64	44.8	44.8	100.0
		Total	143	100.0	100.0	
P	Valid	All others	82	59.4	59.4	59.4
		Unemployed	56	40.6	40.6	100.0
		Total	138	100.0	100.0	

Table S5. Employment status across IMD decile groups

IMD deciles (1 = most deprived)			Frequency	Percent	Valid Percent	Cumulative Percent
1	Valid	All others	145	46.6	46.6	46.6
		Unemployed	166	53.4	53.4	100.0
		Total	311	100.0	100.0	
2	Valid	All others	198	51.8	51.8	51.8
		Unemployed	184	48.2	48.2	100.0
		Total	382	100.0	100.0	
3	Valid	All others	175	57.9	57.9	57.9
		Unemployed	127	42.1	42.1	100.0
		Total	302	100.0	100.0	
4	Valid	All others	142	58.7	58.7	58.7
		Unemployed	100	41.3	41.3	100.0
		Total	242	100.0	100.0	
5	Valid	All others	130	67.4	67.4	67.4
		Unemployed	63	32.6	32.6	100.0
		Total	193	100.0	100.0	
6	Valid	All others	140	70.4	70.4	70.4
		Unemployed	59	29.6	29.6	100.0
		Total	199	100.0	100.0	
7	Valid	All others	82	79.6	79.6	79.6
		Unemployed	21	20.4	20.4	100.0
		Total	103	100.0	100.0	
8	Valid	All others	94	71.2	71.2	71.2
		Unemployed	38	28.8	28.8	100.0
		Total	132	100.0	100.0	
9	Valid	All others	88	83.0	83.0	83.0
		Unemployed	18	17.0	17.0	100.0
		Total	106	100.0	100.0	
10	Valid	All others	86	91.5	91.5	91.5
		Unemployed	8	8.5	8.5	100.0
		Total	94	100.0	100.0	