Received: 27 December 2022 | Revised: 25 September 2024 | Accepted: 1 December 2024

DOI: 10.1111/asap.12446

REGISTERED REPORT

asap Analyses of Social Issues and Public Policy SPSSI WILEY

Testing the interrelationship between area deprivation and ethnic disparities in sentencing

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Funding information
Economic and Social Research Council, Grant/Award Number: ES/W00738X/1

Abstract

In the examination of sentencing disparities, hypotheses related to social class have been relatively overlooked compared to explanations centered on offenders' ethnicity. This oversight is regrettable as both factors often intertwine. In this study, we investigate the mediating and moderating effects between offenders' residential area deprivation and their ethnic background using administrative data encompassing all offences processed through the England and Wales Crown Court. Our findings reveal the following: (i) substantial ethnic disparities among drug offenders, but mostly non-existent across other offence categories; (ii) area deprivation does not explain away the observed ethnic disparities, but pronounced area disparities are found for breach and assault offenses, wherein offenders living in deprived areas are penalized compared to their more affluent counterparts; and (iii) ethnicity and area deprivation interact, but only for breach offenses.

KEYWORDS
Crown Court, deprivation, disparities, ethnicity, sentencing

Public Significance Statement

Sentencing in the Crown Court can be systematically harsher for ethnic minority offenders and for offenders who live in more deprived areas. However, these two forms of disparities are generally not interrelated, and they are only present in specific offense groups. Efforts to redress sentencing disparities should be simultaneously: (i) highly tailored, reflecting the concentration of ethnic disparities amongst drug offenders, and, (ii) expanded, to consider other offender's characteristics such as economic deprivation.

INTRODUCTION

The Lammy Review (2017) brought the question of ethnic disparities in the criminal justice system to the forefront of the political debate in England and Wales. The review documented some hard-to-justify disparities. For example, in relation to the sentencing of drug offenses, the report highlights how the odds of receiving a custodial sentence are 240% higher for ethnic minorities compared to white offenders.[1] Importantly, besides highlighting the problem, Lammy (2017) proposed a new vital principle, "explain or reform", applicable to all criminal justice institutions. More specifically, a series of action points were laid to ensure that such disparities are both documented and redressed. These action points are monitored by the Parliamentary Justice Committee (2019), the Race Disparities Unit at the Cabinet Office, the Ministry of Justice (2020), and all criminal justice agencies involved (see for example The Parole Board, 2018), which illustrates the influence the Lammy Review has had to date and will continue to have in the years to come.

The impact of the Lammy Review can also be evidenced by ensuing reports on the subject of disparities, which expanded the debate to other policy areas, such as housing, education, and health (Race Disparity Unit, 2019), and emphasized social class as another dimension that ought to be considered alongside ethnicity (Commission on Race and Ethnic Disparities, 2021; House of Commons Education Committee, 2021). The latter became particularly present in the political discourse following the Brexit vote, which was widely interpreted as a white working class protest (Antonucci et al., 2017), and heavily capitalized by the subsequent Brexit governments (Centre for Labour and Social Studies, 2016). It seems clear that such novel concerns of class disparities by the UK government were a politically motivated strategy to divert the focus that the Lammy Review placed on racism. Yet, regardless of any political motivations, we believe that the debate on sentencing disparities could be importantly enriched by paying more attention to the relevance of social class.

[1] Most likely the true figure is 140% higher odds, not 240%, since this seems to be derived from an official report (Hopkins et al., 2016), where an odds ratio of incarceration of 2.368 was reported, which should have been expressed as 136.8% higher odds, or 140% if rounded up.

Class disparities in sentencing have been comparatively less thoroughly explored, and when studied, this has been done generally as a separate dimension (see for example Chiricos & Bales, 1991; Miethe & Moore, 1985; Skeem et al., 2020), neglecting the intersectional nature of class and ethnicity (Cunningham & Rious, 2014; Diemer et al., 2013). Several sentencing studies from the US have introduced variables capturing defendants/offenders' level of education, employment, or socio-economic status (Doerner & Demuth, 2014; Ward et al., 2016; Wu & Spohn, 2010), since these are variables often made available by Sentencing Commissions publishing sentencing data. However, for the most part, these variables are used as controls, rarely questioning how they interact with offenders' ethnicity. Some important exceptions are Mitchell (2005), whose meta-analysis of the literature showed ethnic disparities more than halved in studies controlling for socio-economic status, or more recently Donnelly (2021), who found that offender's area deprivation acts as an amplifier of ethnic disparities in sentencing. This last study can be framed within a growing body of research exploring the extent to which area characteristics explain some of the stark ethnic disparities in criminal justice outcomes documented in the United States (Donnelly & Asiedu, 2020). Here, we propose to contribute to this body of literature by testing the potential mediating and moderating effects underlying the intersectional relationship between ethnicity and deprivation in the context of the England and Wales Crown Court.

There are multiple reasons why studying the intersectionality between ethnicity and deprivation is particularly informative. For example, we can think of different mechanisms through which deprivation could be mediating the effect of race on sentencing; such as: (i) judicial considerations of offender's rehabilitative potential determined by their prospects of employment, family structure, or access to rehabilitation programs (Chen et al., 2022); (ii) judicial perceptions of offenders' culpability and dangerousness affected by general perceptions of coldness, incompetence and "otherness" commonly attributed to the poor (Kiebler & Stewart, 2022; Lindqvist et al., 2017); (iii) the type of legal defence afforded (Anderson & Heaton, 2012), an inequality exacerbated in England and Wales in the last decade as a result of cuts to legal aid; (iv) over policing of more deprived areas, which are also the more highly populated by ethnic minorities (Suss & Oliveira, 2022); or (v) even more plainly, exempting the impact of prison to those perceived as more valuable members of society, which was perfectly exemplified—anecdotally—in the case of the Oxford student Lavinia Woodward, who was exempted from a custodial sentence following the stabbing of her boyfriend to avoid damaging her promising future career as a surgeon (BBC News, 2017).

Furthermore, in terms of potential moderators, we should consider how some deprivation-related perceptions of unworthiness, incompetence, or dangerousness are not attributed uniformly across ethnic groups (Petty & Wiener, 2019). In the context of England and Wales, we could hypothesize that working-class white individuals (derogatorily known as "chavs") are particularly looked down upon (Jones, 2020; Tyler, 2008). It is therefore possible that the ethnic disparities reported in the literature could be, on average, partially explained away after taking into account deprivation; while simultaneously, after breaking down the deprivation effect by ethnicity, we might find starker ethnic disparities between the economically better than the worse off groups.

In this study, we propose using new sentencing data made available by the Ministry of Justice (MoJ) in collaboration with the Office for National Statistics (ONS) and His Majesty Courts and Tribunal Service (HMCTS). These are case-level administrative datasets capturing all hearings that took place at the magistrates' and the Crown Court in England and Wales from as early as 2011

(2013 for the Crown Court) to 2020. Besides their unique coverage, these datasets include two key variables that have been so far missing from all previous England and Wales sentencing datasets available to researchers: (i) offenders' ethnicity; and (ii) offender's area of residence, from which we can derive their neighborhood level of deprivation. Leveraging the opportunities afforded by this new data, and focusing on the most common offense types sentenced in the Crown Court, we test the following three hypotheses:

H1 *The probability of receiving a custodial sentence, after adjusting for case characteristics, is at least 10% higher for ethnic minorities than for white offenders.*
H2 *Over half of the ethnic disparities estimated in H1 are mediated by area deprivation.*
H3 *Ethnic disparities are more pronounced for offenders living in average areas compared to offenders living in the top 10% most deprived areas.*

Beyond their academic merit, the above hypotheses relate to key questions that need to be explored if we hope to redress the ethnic disparities recently documented in England and Wales (Hopkins et al., 2016; Isaac, 2020; Lymperopoulou, 2024). There are no easy options to solve this problem. Constraining judicial discretion not only undermines the principle of individualization but in some instances, it has also been shown to be detrimental to proportionality and even lead to further disparities (Fischman & Schanzenbach, 2012). Similarly, the effectiveness of measures like delivering unconscious bias training, or the introduction of notes in sentencing guidelines pointing at evidence of unwarranted disparities, is questionable (Forscher et al., 2019; FitzGerald et al., 2019). However, at the time of writing this study, following a round of consultations, the Sentencing Council for England and Wales has taken the bold action of creating a specific mitigating factor for "Difficult and/or deprived background or personal circumstances", to be applied across all its offense-specific sentencing guidelines from the 1st of April 2024. This is a highly controversial decision, for which no consensus was gathered amongst the judiciary, with numerous voices pointing at the potential risk of undermining the principle of equality under the law. Such an argument could, however, be questioned if either offenders from more deprived neighborhoods are shown to be sentenced more harshly than well-off offenders charged with the same crime, or if area deprivation is found to be mediating the documented ethnic disparities. If that was the case, it would follow that by acting on deprivation sentencers would be redressing, rather than undermining, the principle of equality before the law. This study should therefore offer much needed empirical evidence to illustrate the appropriateness of the consequential measure adopted by the Sentencing Council for England and Wales.

DATA

Our study has been possible thanks to the new sentencing datasets made available by the Data First program. Data First is a research project funded by Administrative Data Research UK and led by the Ministry of Justice, linking datasets from across the justice system and other government departments, and making them available to accredited researchers via secure platforms.[2] Specifically, we use the linked version of the first two datasets released by Data First: the Magistrates'

[2] The application process to access this data can be found here, https://www.gov.uk/government/publications/data-first-criminal-courts-linked-data.

and Crown Court datasets. The former is sourced from extracts of *Libra*, the latter from *XHIBIT*; these are the main administrative databases used by the magistrates' and Crown Court to manage cases across England and Wales (Jackson et al., 2022; Ministry of Justice, 2024a, 2024b). The resulting databases capture all the sentences imposed in England and Wales, together with some demographic information about the offender, and other relevant case characteristics, including the most serious offense type committed (the principal offense).

According to our pre-registered plan[3], our analytical strategy is based on the specification of the probability of receiving a custodial sentence in the Crown Court following a guilty verdict or plea. Given the strong variability in ethnic disparities documented across types of offenses (Hopkins et al., 2016), we estimate separate models for each of the main offense-specific sentencing guidelines. These are: assault, breach, burglary, drugs, fraud, robbery, sex, and theft. For each offense group, we explore the effect of offenders' ethnicity and area deprivation through a sequence of three regression models, one for each of our hypotheses. Ethnicity and area deprivation is introduced differently in each of those three models (see Section 3), however, the set of controls employed does not change. These include: offender's age and sex, offense type, whether a guilty plea was introduced, and the number of previous convictions recorded since 2011. Age is a continuous variable, we center it around the mean and introduce it as an order-two polynomial term to capture the quadratic relationship between age and sentence severity reported in the literature (Ronald & Jacobs, 2002; Steffensmeier et al., 1995).

For offense type, we use the Home Office offense-specific classification. This helps reduce unobserved heterogeneity compared to the standard approach followed in sentencing research, where only broad categorizations of the offense type (such as violence, drugs, sex offenses, etc.) are controlled for (Hopkins et al., 2016; Mitchell, 2005). Using specific offense types is nonetheless problematic because of their sheer number. Based on the pivot tables from the Ministry of Justice (2021) we count 352 different specific offense types sentenced in the Crown Court according to the Home Office code. For reasons of parsimony, we only explore the most common offense types processed in the Crown Court. Specifically, to ensure that the sample size for each offense type is large enough, we consider offenses for which at least 200 cases were sentenced to immediate custody between 2019 and 2020. This represents 35 offense types (listed in Table 1) covering 67.5% of the cases sentenced in the Crown Court, clustered within eight offense groups.[4]

After offense type, the number of previous convictions is the most consequential case characteristic determining decisions of custody. Unfortunately, previous convictions is not directly recorded in the dataset. Instead, we derive it from the number of times the same offender appears in either the Magistrates' or the Crown Court datasets before the case under consideration in our analysis, excluding cases sentenced to absolute discharge. To be able to follow offenders from the Magistrates' to the Crown Court we use the "linked datasets," the version of the sentencing datasets that provides a common unique offender identifier. We are able to retrace previous convictions from as far back as 2011. The datasets record all criminal cases sentenced in England and Wales, yet, limiting the calculation of the number of previous convictions to cases processed from 2011 creates a problem of left-censoring, which will be more pronounced in older cases than in those

[3] Our pre-registered report was first published here: https://www.authorea.com/users/572018/articles/653495-the-interrelationship-between-area-deprivation-and-ethnic-disparities-in-sentencing-deprivation-and-ethnic-disparities-in-sentencing. Further documentation about the peer-review process of the pre-registered report, including the reasons for departures from our initial analytical strategy are available here: https://osf.io/8kqj7/.

[4] The descriptive statistics for the variables used in our analysis and each of these eight samples for different offense groups are available here: https://osf.io/8kqj7/.

TABLE 1 Offense types included in the analysis.

Sentencing guideline	Offense type as classified by the Home Office	Sample size
Assault	5A Wounding with intent to cause grievous bodily harm, 8F Wound-/-inflict grievous bodily harm without intent, 8.01 Assault occasioning actual bodily harm, 8.22 Assault of an emergency worker	10,525
Breach	66.2 Breach of sexual offenses prevention order, 66.4 Breach of a non-molestation order, 66.7 Breach of a criminal behavior order, 8.10 Breach of a restraining order	1035
Burglary	28 Burglary in a dwelling, 29 Aggravated burglary in a dwelling, 30A Burglary in a building other than a dwelling	8944
Drugs	92A.09 Production, supply and possession with intent to supply a controlled drug—Class A, 92A.10 Production, supply and possession with intent to supply a controlled drug—Class B, 92D.01 Possession of a controlled drug—Class A, 92E.01 Possession of a controlled drug—Class B (cannabis)	14,443
Fraud	53.4 Conspiracy to defraud, 53C Fraud by false representation: cheque, plastic card and online bank accounts, 53F Fraud by abuse of position	1482
Robbery	34 Robbery	5152
Sex	19C Rape of a female aged 16 or over, 19D Rape of a female aged under 16, 20A.2 Sexual assault on a female, 22 Sexual activity involving a child under 16, 88A Sexual grooming, 86.1 Taking, permitting, distributing or publishing indecent photographs of children, 88D Exposure and voyeurism	4575
Theft	39 Theft from the person of another, 40 Theft in dwelling not automatic m/c or meter, 41 Theft by an employee, 44 Theft of pedal cycle, 45 Theft from Vehicle, 46 Theft from shops, 48 Theft of a motor vehicle (excl. aggravated vehicle taking)	1695

processed more recently. To minimize this problem we use the full window of observation in the datasets to calculate the number of previous convictions, but restrict our analysis to cases sentenced from 2018 to 2020. This approach will still miss convictions from previous decades, which will inevitably introduce a form of negative systematic measurement error in the variable. However, to some extent, such a form of measurement error is indirectly controlled after including offenders' age in the same model. As we do for age, previous convictions are introduced in our models as an order-two polynomial term (Roberts & Pina-Sánchez, 2014).

In addition to the Magistrates' and Crown Court offenders' data, in this study, we also use open data describing the relative deprivation in local areas across England and Wales (Ministry of Housing, Communities and Local Government, 2022). Specifically, we use the 2019 index of multiple deprivation (McLennan et al., 2019), which is composed of seven domains of deprivations (income, employment, education, skills, and training, health and disability, crime, barriers

to housing services, and living environment). This index of deprivation is matched to the Magistrates' and Crown Court data using the Lower Layer Super Output Areas (LSOAs), which are geographical hierarchies used to report statistics in small areas, covering one to three thousand residents.[5] The index of deprivation is a continuous variable, however, to facilitate interpretations we do not use each area's specific value of deprivation, but rather their percentile. In addition, we reversed the order of these percentiles, so higher values refer to more deprivation, and we centered this variable around the mean so the reference category will be an offender from the average LSOA.

Lastly, offenders' ethnicity is operationalized as a binary variable, indicating whether the offender is white, or from any other ethnic group. This involves collapsing three of the ethnic categories available (Asian, black, and other) into a single category, which incurs a loss of information. We nonetheless favor this approach for the sake of parsimony, particularly needed when exploring potential moderating effects between area deprivation and social class. In addition, it should be noted that the ethnicity variable used captures offenders' ethnicity as determined by the police. We decided to use this variable rather than a self-reported measure of ethnicity—also available in the dataset—since a police officer's perception of the offender's ethnicity will likely overlap more closely with the judge's perception, which represents the decision-making process that we seek to model (Pina-Sánchez et al., 2024).

The police-defined ethnicity variable used in our analysis is also less prone to missing data, with 22.8% missing compared to 25.1% in the self-reported measure of ethnicity. To further reduce the prevalence of missing data, we managed to use the offender unique ID to impute 6482 where police-reported ethnicity was missing from the Crown Court dataset but this information was available in the magistrates' court records. This ad-hoc imputation reduced the number of cases with missing ethnicity data to just 8,533 cases, 13% of our target sample. Additionally, we also encountered that 16% of cases provided no LSOA information. Combined, these resulted in a total of 17,902 missing cases, 27.2% of our target sample. To facilitate the computation of marginal effects in our models—a procedure required to estimate conditional probabilities of custody from our models—we opted to exclude missing cases using listwise deletion. This left us with a total of 47,851 cases 72.8% of our target sample. The specific sample size used for each offense group is reported in Table 1. To test the robustness of our findings to listwise deletion we replicated our analysis after imputing missing ethnicity and area deprivation using multiple imputation. These analytical procedures are discussed in the next section.

MODELING STRATEGY

The outcome variable across our models is whether a custodial sentence is imposed. This is specified using binary logit models, estimated for each of the eight samples derived from the main sentencing guidelines. Random intercept terms are introduced to account for the between court variability that has been reported in the literature (Drápal, 2020; Pina-Sánchez & Linacre, 2013). All our models are estimated using the command *melogit* in Stata 17.

Our modeling strategy is built sequentially through three sets of nested models, used to test each of the three hypotheses formulated in Section 1. The composition of these three sets of models is shown visually using causal diagrams (Pearl, 2009; VanderWeele & Staudt, 2011) in Figure 1. The direction of the expected causal effects is represented by arrows, with *ethn* reflecting offend-

[5] The matching process followed complied with the principles of the Five Safes (Office for National Statistics, 2022a) and the conditions for matching data in secure settings (Office for National Statistics, 2022b).

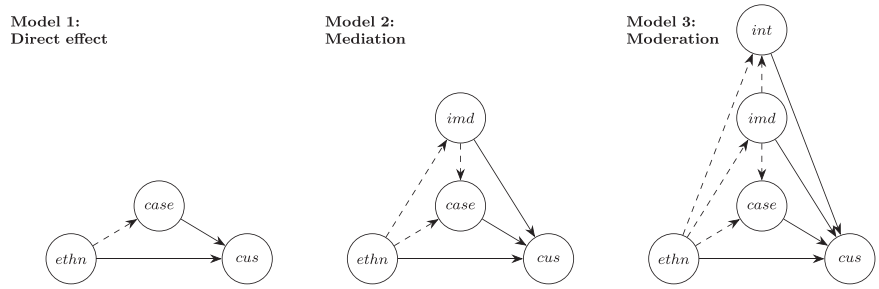

FIGURE 1 Modeling strategy depicted using causal diagrams. The solid lines represent the specific effects that will be estimated, the dashed lines represent indirect causal mechanisms expected to be present but not explored in our analysis.

ers' ethnicity, *case* stands for the set of case characteristics used as controls, *imd* for the index of multiple deprivation in the area of residence of the offender, and *int* for the interaction between offenders' ethnicity and area deprivation. The direct effects used to test our three hypotheses are depicted as solid arrows, while dashed arrows are used to represent indirect effects that we expect to be part of the data-generating mechanism but are not explored in this study.

Model 1 serves as the foundation of our analytical plan. This model is used to test the presence of ethnic disparities (H1: *The probability of receiving a custodial sentence, after adjusting for case characteristics, is at least 10% higher for ethnic minorities than for white offenders*). As such, the importance of this model is twofold: (i) it allows us to assess whether Hopkins et al. (2016) findings of ethnic disparities can be reproduced using more recent samples and different sets of controls, and (ii) it serves as the benchmark for H2. A 10% cut-off point is chosen to corroborate H1 since lower disparities could be considered substantively negligible, and potentially the result of methodological problems such as selection or confounder bias. For context, Hopkins et al. (2016) reported over twice larger odds of incarceration for ethnic minorities compared to white offenders, when considering drug offenses, but a statistically non-significant odds ratio of 1.2 when considering sexual offenses. To test our hypotheses, we use average marginal effects instead of odds ratios since these are more intuitive and facilitate comparisons across ethnic groups and offense categories regardless of the baseline custody rate. That is, in relation to H1, the minimum 10% cut-off point will be taken as the average ratio of adjusted probabilities of custody for ethnic minorities compared to white offenders, across all the observations considered in each of our samples. To estimate marginal effects we use the *margins* command in Stata 17. The Stata code is available as part of the study's supplementary materials.

To test H2 (*Over half of the ethnic disparities estimated in H1 are mediated by area deprivation*) we estimate Model 2, which includes area deprivation as an explanatory variable. We choose the cut-off point 'over half the effect size' in ethnic disparities being explained away by area deprivation, to reflect the high confidence that has been placed by commentators and politicians (Commission on Race and Ethnic Disparities, 2021) in this hypothesis. That is, in order to support the view that the documented ethnic disparities are actually the result of not having adjusted for the offender's relative deprivation, we would expect the size of such a biasing effect to be large enough to explain away most of the observed ethnic disparities.

To test H3 (*Ethnic disparities are more pronounced for offenders living in average areas compared to offenders living in the top 10% most deprived areas*) we estimate Model 3, which includes the interaction between ethnicity and area deprivation. To test this hypothesis we do not use average

TABLE 2 Results of the tests of H1 (*the probability of receiving a custodial sentence, after adjusting for case characteristics, is at least 10% higher for ethnic minorities than for white offenders*).

Offense group	Odds ratio of custody	Average predicted probability of custody		
	Minority/White	White	Minority	H1
Drugs	1.42 (1.31, 1.53)	0.58	0.65	✓
Assault	1.17 (1.05, 1.31)	0.58	0.61	X
Burglary	1.09 (0.95, 1.25)	0.73	0.75	X
Breach	1.01 (0.73, 1.39)	0.62	0.62	X
Fraud	1.09 (0.86, 1.38)	0.51	0.53	X
Sex	1.21 (0.99, 1.49)	0.53	0.56	X
Theft	0.94 (0.73, 1.22)	0.54	0.53	X
Robbery	1.14 (0.95, 1.33)	0.75	0.77	X

Note: 95% confidence intervals of the odds ratios of custody are presented within parentheses. H1 is only validated for drug offenses.

marginal effects, but rather the marginal effects for white and ethnic minority offenders when the index of deprivation associated with their area of residence changes from the ninth to the fifth decile, i.e. from highest to median levels of deprivation. The difference in such effects is determined using a test of second differences (Mize, 2019; Mize et al., 2019).

Lastly, to test the robustness of our findings we conduct two types of sensitivity analyses. To test the assumption of missing completely at random, which we implicitly invoke when we consider listwise deletion of missing cases, we replicate our models after adjusting for missing data using multiple imputations. Specifically, we use the *jomo* package in R (Quartagno & Carpenter, 2023), to estimate five sets of imputations under a multivariate normal joint model, using all the variables introduced in our analysis, together with court location and whether the offender was placed on remand, as auxiliary data. To assess the robustness of our findings from confounding bias, which could potentially stem from having failed to control for relevant legal factors such as aggravating and mitigating factors, or other offenders' characteristics such as their level of education or nationality, we use the E-value (VanderWeele & Ding, 2017). This is a simple form of sensitivity analysis as it indicates how "strong" a hypothetical unobserved confounder has to be for the estimate of interest to be completely spurious; i.e. the result of confounding bias entirely. Put more precisely, the E-value summarizes through a single point estimate the required strength of the association of a hypothetical unobserved confounder, with both the outcome and the causal variable, so the estimated effect of interest is rendered non-existent.

RESULTS

Given the large number of models estimated (three hypotheses times eight offense groups) we summarize our main findings in three tables, one for each of the hypotheses considered. The full results for each of the models estimated are available as part of the study's supplementary materials.

Table 2 shows the results from the tests on H1 (*The probability of receiving a custodial sentence, after adjusting for case characteristics, is at least 10% higher for ethnic minorities than for white offenders*). We find statistically significant estimates for ethnicity in two of the offense groups

explored, assault and drug offenses, both of them pointing at the harsher treatment of ethnic minority offenders. However, the effect size is only sufficiently large to validate H1 for drug offenses. For that group, and after adjusting for case characteristics, the odds of custody for ethnic minority offenders is 42% higher than for white offenders. In terms of marginal effects, that disparity represents a difference of seven percentage points. Specifically, after adjusting for case characteristics, the average probability of custody for drug offenders who are white is 0.58, increasing to 0.65 for ethnic minority offenders convicted of the same crime. When we consider assault offenses, the ethnic disparity expressed in the average probability of custody only amounts to three percentage points, which can be considered negligible. In all the other six offense groups explored ethnic disparities are even less pronounced, showing remarkable uniformity across white and ethnic minority groups.

Regarding H2 (*Over half of the ethnic disparities estimated in H1 are mediated by area deprivation*), we do not observe a single offense group for which the estimated effect of ethnicity appears to be mediated by area deprivation. This is even the case for drug offenses, where we have just documented substantial ethnic disparities. Such ethnicity effect remains completely unabated after including area deprivation in the model, therefore we reject H2 throughout. However, as shown in Table 3, we have detected statistically significant effects of area deprivation in drugs, assaults, breaches and sex offenses. For these offense types, it is more likely that offenders living in more deprived areas will receive a custodial sentence. These disparities are particularly strong in the case of assault and breach offenses. For example, after controlling for case characteristics, the average probability of custody amongst breach offenders who reside in the ten percent most deprived neighborhoods is 0.63, but this probability is down to 0.51 when we consider breach offenders who reside in the ten percent least deprived neighborhoods.

Results from the tests of H3 (*Ethnic disparities are more pronounced for offenders living in average areas compared to offenders living in the top 10% most deprived areas*) are shown in Table 4. This hypothesis is only validated for breach offenses, where we found a statistically significant and large interaction effect between ethnicity and area deprivation. For this offense group, if we consider offenders from the most deprived areas we can see strong ethnic disparities penalizing ethnic minority offenders. Specifically, after controlling for case characteristics, ethnic minority offenders from the most deprived percentile convicted of the breach have an estimated average probability of custody of 0.73 while that probability is 0.61 for their white counterparts. However, when we consider offenders from average areas the ethnic disparities are reversed, the probability of custody is 0.58 for white offenders, but only 0.48 for ethnic minority offenders.

In fact, it seems that the way this interaction between ethnicity and area deprivation works is by disentangling a deprivation-related disparity that is exerting a vast influence amongst ethnic minority offenders specifically. For example, if we consider white offenders convicted of breaching their probabilities of custody range from 0.61 to 0.5 depending on whether they come from the most or least deprived areas, respectively. However, that same probability range is 0.73–0.29 when we consider ethnic minority offenders.

In summary: (H1) the presence of ethnic disparities is only confirmed for drug offenders, (H2) the expected mediating effect of area deprivation is rejected across all offense groups, and (H3) the hypothesized moderating effect of area deprivation on ethnic disparities was only confirmed for breach offenses. These results are robust to missing data checks, which we conducted by assessing the consistency of the odds ratios reported in Tables 1–3 after replicating our models using multiple imputation instead of discarding them through listwise deletion. None of the reported odds ratios varied by more than 8% and only two of them varied by more than 5%. The full results of this robustness check are available as part of the study's supplementary materials.

TABLE 3 Results of the tests of H2 (*over half of the ethnic disparities estimated in H1 are mediated by area deprivation*).

Offense group	Odds ratio of custody		Average predicted probability of custody				
	Minority/White	Area deprivation	White	Minority	Least deprived	Most deprived	H2
Drugs	1.45 (1.33, 1.58)	1.01 (1.01, 1.04)	0.55	0.62	0.55	0.58	X
Assault	1.18 (1.05, 1.32)	1.06 (1.04, 1.08)	0.55	0.58	0.48	0.58	X
Burglary	1.08 (0.93, 1.26)	1.01 (0.99, 1.03)	0.70	0.72	0.69	0.71	X
Breach	1.09 (0.78, 1.53)	1.06 (1.01, 1.12)	0.59	0.61	0.51	0.63	X
Fraud	1.03 (0.79, 1.32)	1.01 (0.96, 1.05)	0.49	0.50	0.48	0.49	X
Sex	1.22 (0.98, 1.51)	1.03 (1.01, 1.05)	0.50	0.54	0.48	0.52	X
Theft	0.89 (0.67, 1.18)	1.01 (0.96, 1.05)	0.50	0.48	0.49	0.50	X
Robbery	1.10 (0.93, 1.31)	1.01 (0.97, 1.03)	0.72	0.74	0.72	0.73	X

Note: 95% confidence intervals of the odds ratios of custody are presented within parentheses. H2 is not validated for any offense group, but substantial deprivation-related disparities are observed across breach and assault offenders.

TABLE 4 Results of the tests of H3 (*ethnic disparities are more pronounced for offenders living in average areas compared to offenders living in the top 10% most deprived areas*).

Offense group	Odds ratio of custody Interaction deprivation*minority	Average predicted probability of custody				
		Average area & white	Average area & minority	Most deprived & white	Most deprived & minority	H3
Drugs	0.97 (0.93, 1.01)	0.53	0.62	0.56	0.62	X
Assault	1.01 (0.96, 1.05)	0.52	0.55	0.58	0.61	X
Burglary	1.03 (0.96, 1.10)	0.70	0.70	0.71	0.73	X
Breach	1.21 (1.04, 1.42)	0.58	0.48	0.61	0.73	✓
Fraud	1.02 (0.93, 1.13)	0.49	0.48	0.49	0.51	X
Sex	0.99 (0.91, 1.08)	0.49	0.53	0.52	0.55	X
Theft	1.05 (0.93, 1.21)	0.50	0.44	0.50	0.50	X
Robbery	1.04 (0.97, 1.11)	0.72	0.72	0.72	0.75	X

Note: H3 is validated for breach offenses.

DISCUSSION

Our analysis of custodial sentences imposed in the Crown Court from 2018 to 2020 has revealed that, for the most part, area deprivation does not mediate nor moderate ethnic disparities in the probability of receiving a custodial sentence. We therefore reject the hypothesis that ethnic disparities in sentencing are the result of unaccounted deprivation-related disparities, or that ethnic disparities are less pronounced when considering offenders from more deprived areas. Unlike what we theorized in the conceptualization phase of this study, we see that, for the case of the Crown Court, when ethnic disparities and deprivation-related disparities arise, they do so independently of each other. The only exception was detected for the case of breach offenses. For that offense group we found evidence of a substantial interaction effect. Specifically, we observed that area deprivation does not affect the sentencing of white offenders but it strongly influences the sentencing of ethnic minority offenders, making ethnic minority offenders that live in affluent areas far more likely to avoid custody than those who live in deprived areas. The reason behind such an effect, or why it is only seen in the case of breach offenses, is, however, unknown to us.

The broadly independent ethnic and deprivation-related effects reported here are likely a result of the rather small ethnic disparities detected, a necessary condition for the presence of mediation and moderation effects that is not met in our findings. Out of eight offense groups considered we only found statistically significant ethnic disparities for assault and drug offenders, and these were only substantively significant for the latter. This is a surprising result considering the large ethnic disparities reported in the literature on the Crown Court (Hopkins et al., 2016; Lymperopoulou, 2024). One reason explaining why our findings contradict the literature might be due to having aggregated all ethnic minorities into the same group, a modeling simplification adopted to explore deprivation-related mediating and moderating effects robustly, which might nonetheless be attenuating disparities observed against specific ethnic minority groups.

Even if that is the case, our findings suggest that perceptions of widespread ethnic disparities in the Crown Court need to be nuanced. By examining disparities separately by offense groups, as we have done in this study, we find that they are highly concentrated. Thus, this issue appears not to be systemic but rather predominantly present in the sentencing of drug offenders. Addressing this could involve reconsidering the sentencing factors specified in the offense-specific drug sentencing guidelines. Furthermore, focusing solely on drug offenses, the disparity magnitude we uncovered is significantly lower than what was previously reported (Hopkins et al., 2016; Isaac, 2020; Lammy, 2017), suggesting that ethnic disparities in England and Wales have decreased over the past decade. For instance, Hopkins et al. (2016) reported that ethnic minorities faced 137% higher odds of incarceration compared to their white counterparts for drug offenses in the Crown Court, whereas we only found a 42% higher odds differential for the same demographic group, criminal court, and roughly similar offense types.

Our study, however, has revealed worrying deprivation-related disparities. In particular, we found that assault and breach offenders who reside in more deprived areas are over ten percentage points more likely to receive a custodial sentence than those who live in the least deprived areas. These disparities corroborate findings documented in the United States (summarized in Donnelly & Asiedu (2020)), but to the best of our knowledge, such disparities have not been previously documented in the United Kingdom. This is important, especially in the light of the recent efforts

that the Sentencing Council for England and Wales has placed to explore strategies to reduce different forms of unwarranted disparities in sentencing.

Policy implications and future avenues of research

Although highly localized in specific offense groups, as opposed to a system-wide problem, the unwarranted disparities documented in this study are highly problematic. They point to a likely violation of the principle of equality under the law. This, in and of itself, is grounds for action. Unwarranted disparities can also damage trust and confidence in the sentencing system, particularly amongst affected groups. Where there is a lack of trust in criminal justice institutions and procedures, this can in turn affect perceptions of legitimacy and result in lower levels of compliance (Paternoster et al., 1997; Tyler & Huo, 2002; Hough et al., 2013). Therefore, unless unwarranted disparities are addressed, they will exacerbate, and potentially perpetuate, the existing cycle of inequalities within the criminal justice system.

In recent years, the Sentencing Council has made efforts to reduce both ethnic and deprivation-related disparities in sentencing. To address ethnic disparities a note has been introduced in the "Mental disorders, developmental disorders, or neurological impairments" overarching sentencing guideline, which applies to all offenses. This note is intended to make sentences aware of relevant ethnicity considerations in the context of offenders affected by mental health disorders. Specifically, the note highlights evidence suggesting that *"people from ethnic minority backgrounds may be more likely to experience stigma attached to being labeled as having a mental health concern"* and *"may be more likely to have experienced difficulty in accessing mental health services"* (Sentencing Council, 2020, p.5). Another note has also been included in the expanded explanation for the mitigating factor of "remorse" in all sentencing guidelines. This emphasizes how a person's demeanor in court or the way they articulate feelings of remorse may be affected by communication difficulties (including where English is not their first language) and it reminds judges of the Equal Treatment Bench Book, which provides guidance on how to ensure fairness for defendants and offenders involved in court proceedings. While these reforms do target areas that have been identified in the literature as being potentially problematic, they are somewhat limited in their approach (i.e., simple reminders) and broad in their application (across all offenses).

As for deprivation-related disparities, the idea of treating economic deprivation as a mitigating factor has periodically been discussed over the last couple of decades (Chen et al., 2022; Tonry, 1995; Veiga et al., 2023; Von Hirsch & Ashworth, 2005). At the time this study was pre-registered, a specific "deprivation" mitigating factor had yet to be included in sentencing guidelines in England and Wales. Subsequent to the pre-registration of our study, the Sentencing Council conducted focus groups with sentencers to ascertain their views on a proposal to include a new mitigating factor of "Difficult and/or deprived background or personal circumstances" in the sentencing guidelines. The views expressed by magistrates and judges were summarized in a Sentencing Council (2024a) report as being predominantly neutral or negative toward the proposal. A public consultation was also undertaken, gathering mixed responses (Sentencing Council, 2024c). The most frequent negative comment was in reference to the principle of equality before the law. In short, a mitigating factor of this kind would end up disadvantaging those who did not come from difficult or deprived backgrounds (Sentencing Council, 2024c). Having considered all views, the Sentencing Council decided that a mitigating factor of "Difficult and/or deprived background or personal circumstances" should be introduced in all offense specific sentencing guidelines, coming into effect on the 1st of April 2024. In principle, findings from our study support such decision. We documented that, for assault, breach, and less prominently for sex offenses too, offenders

from more deprived neighborhoods are sentenced more harshly than offenders from better-off neighborhoods, and therefore, by taking into account offenders background sentencers would be redressing, not undermining, the principle of equality before the law. However, as with the efforts to reduce ethnic disparities noted above, the change was introduced across the board for all offenses, rather than targeting those where deprivation-related disparities are present, which could give rise to unwarranted disparities of its own when applied to offenses where neither deprivation nor ethnic disparities were detected.

We believe a more tailored approach might be more appropriate. Sentencing in England and Wales is structured through offense-specific guidelines, which the Sentencing Council is iteratively streamlining to address issues of clarity, consistency and proportionality. Findings from our study detecting strong ethnic and deprivation-related disparities in the sentencing of drugs, assault and breach offenders allows for a more precise policy response. As a first step the Council could include an additional note in the sentencing guidelines for each of the problematic offenses to make judges aware of the documented evidence of disparities. A note along these lines, alerting sentencers of documented ethnic disparities, has already been included in the drug offense guidelines (see Sentencing Council, 2021). This could now be replicated for deprivation-related disparities in the assault and breach guidelines. The effectiveness of these reminders to redress unwarranted disparities, however, is somewhat uncertain, both in terms of the extent to which judges refer to additional notes in guidelines (Chen et al., 2022; Sentencing Council, 2023) and their ability to alter sentencing practice (FitzGerald et al., 2019; Devine et al., 2012; Blair, 2002). Yet, given the limited risk of unintended consequences, their low cost, and relative ease at which these amendments could be introduced, there is, a strong argument for the introduction of our recommended additional notes.

Assessing the impact of the different new measures recently adopted by the Sentencing Council to redress unwarranted disparities should be a key research priority, of interest to criminal justice practitioners, policy-makers and researchers, in the United Kingdom and elsewhere given how influential the England and Wales guidelines system has become. Additionally, to help develop more effective policy responses it would be essential that future research seeks to identify the specific causal mechanisms through which offenders deprivation influences sentence severity. Is this just a matter of the quality of the legal defence affordable? If so, this would further illustrate the devastating effect that limiting access to legal aid has had on the principle of equality under the law in the United Kingdom. Alternatively, it is also possible that the observed disparities reflect different perceptions amongst probation officers and judges of offender's potential for rehabilitation, perhaps derived mainly from offenders' level of education? Or perhaps it is a more subjective matter of prejudice against working class or foreign born offenders, which could in turn be mediated through a stronger accent, presentational aspects like clothing, or perhaps demeanor in court. In this respect, it would be extremely useful if future instalments of the Magistrates and Crown Court datasets from Data First were to include additional offender characteristics, which are routinely recorded in court settings and should therefore be possible to access, such as offender's nationality, or other key case characteristics such as the type of legal defence, or whether the offenders were representing themselves.

Limitations and robustness checks

The findings presented in this study are likely affected by different types of bias. For example, the presence of missing data could lead to selection bias (Stockton et al., 2023), failing to control for

relevant case characteristics considered by the judge could create unobserved confounding bias (Ward et al., 2016), whereas the use of area deprivation as a proxy for the offender's individual level of deprivation could be seen as a measurement error problem (Pina-Sánchez et al., 2023). However, we do not think any of the above will generate a form of bias strong enough to change our main conclusions in relation to the hypotheses tested.

It is unfortunate that, of all the variables used in the analysis, the only two affected by missing data are our focal variables, ethnicity and area deprivation. At 27%, the proportion of missing cases is not extreme, but even such relatively small proportion could still be exerting a strong bias in our findings if the missing cases were missing not at random (Stockton et al., 2023). For example, if the reason for the missingness of offender's ethnicity data is somehow related to racist criminal justice practices, which is something that we cannot rule out entirely. However, the robustness checks we undertook using multiple imputation showed that our findings remain largely unchanged when replicated under the assumption of missing at random. That is, when we assume that the missing cases can be predicted using other variables available in the dataset. Therefore, we are relatively confident that our study is not severely affected by selection bias due to missing data.

Similarly, the large cut off points used to corroborate our hypotheses turn them into rather conservative tests, reducing the probability of false positives, which makes us again relatively confident that none of the disparities reported are the result of unobserved confounder bias. This can be further illustrated using the E-value (VanderWeele & Ding, 2017), reflecting the required strength for a potential unobserved confounder to render the estimated effect non-existent. For example, for the case of drug offenses, where we estimated 42% higher odds of custody for minority offenders than for white offenders, and given a baseline custody rate of 67% for white drug offenders in our sample, we estimate an E-value expressed as a risk ratio of 1.45. This means that for the detected ethnic disparity to be completely spurious (i.e., the odds ratio of ethnicity equal to 1), the hypothetical unobserved confounder should increase the probability of receiving a custodial sentence by at least 45%, and simultaneously, this confounder should also be at least 45% more prevalent in ethnic minority than in white offenders. The former condition is quite likely since many harm, culpability and aggravating factors listed in the sentencing guidelines, which we failed to control for in our analysis, have been shown to meet that threshold. For example, Pina-Sánchez & Harris (2020) shows that case characteristics relevant to drug offenses such as high purity, large scale operation, or community impact, to name a few, increase the risk of custody substantially. However, the second condition is far less likely and could be ruled out entirely. Using data from the Sentencing Council referring to drug offenders sentenced in the Crown Court, Guilfoyle and Pina-Sánchez (2024) have shown that most factors considered in the sentencing guidelines are remarkably uniformly distributed across ethnic groups. In fact, the most significant exceptions are found for personal mitigating factors, which tend to feature more commonly amongst white than ethnic minority offenders. In consequence, given that mitigating factors reduce the probability of receiving a custodial sentence, having failed to control for these factors is likely biasing downwards - not upwards - the ethnic disparities reported here.

Lastly, the use of area deprivation as a proxy for individual deprivation could be seen as a problem of Berkson measurement error (Berkson, 1950). These types of errors tend to be present in cases where data is highly aggregated so part of the between individual variability is lost (Heid et al., 2004). Importantly, unlike the more commonly considered classical errors, Berkson measurement error does not lead to attenuated estimates of regression coefficients, it only reduces the precision of those estimates (Carroll et al., 2006). However, since we have favored substantive sig-

nificance over statistical significance to test our hypothesis, such loss of statistical power should not affect the conclusions presented in this study.

ACKNOWLEDGMENTS

This work was supported by the Secondary Data Analysis Initiative of the Economic and Social Research Council (Grant Ref: ES/W00738X/1).

DATA AVAILABILITY STATEMENT

This work was undertaken in the Office for National Statistics (ONS) Secure Research Service using data from ONS and other owners and does not imply the endorsement of the ONS or other data owners. Adherence to the ONS "Five Safes" was upheld to ensure privacy and confidentiality of the subjects recorded in the datasets that were used. The application process to access this data can be found here, https://www.gov.uk/government/publications/data-first-criminal-courts-linked-data. The code used in our analysis is available here: https://osf.io/8kqj7/

OPEN RESEARCH BADGES

This article has earned Open Materials and Preregistered Research Design badges. Materials and the preregistered design and analysis plan are available at https://osf.io/8kqj7/.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Pina-Sánchez, J., Morales, A., Guilfoyle, E., Veiga, A., & Geneletti, S. (2025). Testing the interrelationship between area deprivation and ethnic disparities in sentencing. *Analyses of Social Issues and Public Policy*, *25*, e12446. https://doi.org/10.1111/asap.12446