




ORIGINAL ARTICLE

The relationship between ethnic background and the use of restrictive practices to manage incidents of violence or aggression in psychiatric inpatient settings

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ABSTRACT: Restrictive practices raise considerable concern in mental health inpatient care. Previous studies suggest there are disparities in the use of restrictive practices to manage service users of different ethnic groups. The present study analyses the relationship between ethnicity and the use of restrictive practices to manage incidents of violence or aggression in inpatient settings across an NHS Mental Health Trust. Three years' worth of routinely collected incident data were analysed using multilevel multiple logistic regression to assess the relationship between ethnic group and four types of restrictive practices: physical restraint (without prone), physical restraint (with prone), seclusion, and rapid tranquilization. We controlled for a range of demographic variables and the type and severity of the incident. Adjusted analyses showed that service users with a Black African [Odds Ratio = 1.96, 95% CI: 1.36–2.83, $P < 0.001$], Black Caribbean [Odds Ratio = 1.76, 95% CI: 1.08–2.85, $P = 0.022$], Black Other [Odds Ratio = 1.76, 95% CI: 1.27–2.44, $P = 0.001$], and Mixed [Odds Ratio = 1.88, 95% CI: 1.11–3.18, $P = 0.019$] ethnic background were more likely to be secluded, and Black Caribbean [Odds Ratio = 1.45, 95% CI: 1.02–2.07, $P = 0.040$] service users were more likely to be restrained in prone position. We did not detect differences in the use of physical restraints without prone or in the use of rapid tranquilization. Our findings illustrate the need to focus on outcomes for different ethnic groups when implementing restraint reduction programmes.

KEY WORDS: ethnic differences, mental health, mental health services research, psychiatry, restrictive practices.

INTRODUCTION

Restrictive practices remain common in mental health hospitals. These interventions include physical restraint,

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chemical restraint, mechanical restraint, seclusion, and segregation. They are typically used to manage situations where service users pose an imminent danger to themselves and/or others (Department of Health (DOH) 2014). The assessment of danger is subjective. In practice, these situations often involve violence or aggression, self-harm, challenging behaviour, medication refusal, and attempts to abscond.

Service users often report that restrictive practices are traumatizing, distressing, and dehumanizing (Cusack *et al.* 2018). Prone restraint, where the patient is restrained face down, has resulted in serious injury and occasionally death (Sethi *et al.* 2018), and its

efficacy is questionable. Given the psychological and physical consequences of restrictive practices, efforts have been made to reduce their use. The UK Department of Health issued a framework for reducing the need for restrictive practices by taking a positive and proactive approach to patient care (DOH 2014).

Data published by NHS Digital show that over 10 000 people were subject to restrictive practices by mental health services in England over 2018/19 (NHS Digital 2019). Concerningly, people from some ethnic minority backgrounds are over-represented in restrictive practice statistics. Population-level statistics show that 16.3 per 100 000 White people were subject to restrictive practices by mental health services in England over 2018-19, compared to 32.7 per 100 000 Mixed ethnicity people, and 49.1 per 100 000 Black people (NHS Digital 2019). Other ethnic groups are restrained at rates more like those seen for White people, with people of Asian ethnicity being restrained at a rate of 12.8 per 100 000 people and people with Other ethnicity at a rate of 23.3 per 100 000 people (NHS Digital 2019).

A complex interplay of factors likely contributes to ethnic differences in rates of restrictive practice, which includes ethnic disparities along care pathways (Halvorsrud *et al.* 2018). There are inequalities in the level of contact with primary care health services (Cooper *et al.* 2013), in rates of detention under the Mental Health Act (NHS Digital 2019), and in the length of ward stays (Bruce & Smith 2020). These factors mean people from some ethnic minority backgrounds are more likely to be in psychiatric inpatient settings where being subject to restrictive practice becomes a possibility. In addition to this, it is important to understand whether restrictive practices are more likely to be used to manage a risky incident if service users are from ethnic minority backgrounds.

A systematic review showed that studies are more likely to find ethnic minority status increases the risk of restraint when they do not control for confounders (Beghi *et al.* 2013). For example, a study of US psychiatric hospitals found that the rate of seclusion was higher among ethnic minority and younger service users but did not report if there were systematic age differences across ethnic groups (Smith *et al.* 2005). Another study of US psychiatric hospitals found that the over-representation of ethnic minority service users in seclusion and physical restraint statistics disappeared when the analysis was stratified by age (Carpenter *et al.* 1988). Younger service users were more likely to be subject to restrictive practice, and Black and

Hispanic service users were younger than White service users, on average. This demonstrates the importance of accounting for confounding variables when analysing the relationship between restraint and ethnicity.

On the other hand, some studies adjusting for confounders still detect a relationship between ethnicity and restrictive practice. In Italy, a study of PICU service users matched for clinical severity and socio-demographic factors found immigrant service users had 3.7 times greater risk of being physically restrained than Italian-born service users (Tarsitani *et al.* 2013). Similarly, a study of a Norwegian psychiatric emergency department found immigrant service users experienced physical restraint at a higher rate after controlling for age and gender (Knutzen *et al.* 2007). A study of child and adolescent inpatients in a US psychiatric hospital found that Black service users were more likely to experience physical restraint and seclusion than White service users after adjusting for demographic factors and route to admission (Donovan *et al.* 2003). These studies measured the incidence of restrictive practice relative to the ethnic breakdown of the inpatient population. However, we need to measure the incidence of restrictive practice relative to the number of incidents service users from different ethnic groups are involved in. The reason for this is if one ethnic group is disproportionately involved in incidents, they will be over-represented in restraint statistics irrespective of whether restrictive practices are being applied inequitably.

Gudjonsson, Rabe-Hesketh and Szmukler (2004) analysed ethnic group differences in the use of different types of restraint following an incident of violence in two South London hospitals using multilevel multivariate logistic regression. The study found no differences in rates of physical restraint. While unadjusted analyses showed that Black service users were more likely to be given emergency medication and to be secluded, these effects disappeared when the analysis was adjusted for demographic variables, antecedents to the violent incident, and whether the patient had been detained formally. This lack of association has been replicated in another study using data from mental health hospitals across England, which found no association between ethnicity and coercion when controlling for age, gender, diagnosis, and institution (Bennewith *et al.* 2010).

To assess the relationship between ethnicity and risk of restrictive practice, we conducted multilevel logistic regressions using routinely collected data on incidents

of violence or aggression. The restrictive practices we analysed were physical restraint (without prone), physical restraint (prone), seclusion, and rapid tranquilization. We controlled for a range of demographic covariates, as well as covariates related to the nature of the incident.

METHODS

This is an observational study that uses routinely collected data to assess the relationship between ethnic group and the odds of being subject to restrictive practices following an incident of violence or aggression. We analysed incidents occurring in all inpatient settings across a South London NHS Mental Health Trust. We extracted incidents of violence or aggression from the Trust's incident reporting system, occurring between 1 April 2017 and 31 March 2020. We looked at four types of restrictive practice, physical restraint (where prone position was not used during the physical restraint), seclusion, prone restraint, and rapid tranquilization.

We included four types of incident in the analysis: violence or aggression targeting staff, violence or aggression targeting service users, challenging behaviour, and damage to property. This was to provide a comparison between incidents with a recorded human target and those where no specific human target was recorded. In addition, there are four incident severity classes. B – Severe, C – Moderate, D – Low, and E – No Adverse Outcome. Severity is assigned by staff at the time of the incident and is based on factors such as the level of injury the incident causes, its effect on length of hospital stay, and the number of patients the incident impacts.

Ethnicity is self-specified by service users. Ethnicities are grouped into larger ethnic groups based on those used in the UK's 2001 Census (UK Gov. 2001). These are as follows: White, Mixed, Black, Asian, and 'other ethnic group'. We used these ethnic groups in our analysis, except for Black service users where we analysed the effects by Black Caribbean, Black African, or any other Black background ('Black Other') separately. The areas served by the Mental Health Trust in this study have a large Black population, which meant there were sufficient numbers to analyse groups separately, in order to understand the effects across diverse categories.

We combined incident data with demographic data and whether the patient was formally detained under the Mental Health Act at the time of the incident from

the Trust's electronic patient health records system. We used postcodes to map a proxy variable for socioeconomic status. The Index of Multiple Deprivation (IMD), published by the Ministry of Housing, Communities & Local Government (UK Government 2019), ranks deprivation in areas of England based on income, employment, education, health, crime, barriers to housing and services, and living environment. We imputed the minimal IMD Rank of 1 for service users of no fixed abode. We imputed the median IMD rank for any service users with missing postcode data. The ranks were standardized so that the results can be interpreted in terms of a one standard deviation move away from the average rank.

Ethical approval

Ethical approval was received by the South London and Maudsley NHS Trust's ethical approval committee for clinical audits, service evaluations, and other quality improvement projects. The project was also approved by the Trust's Information Governance team.

Statistical analysis

We performed multilevel logistic analyses to test the association between ethnic group and the odds of being subject to each type of restrictive practice. Since some service users are subject to restrictive practices on multiple occasions, we used multilevel modelling to account underlying patient heterogeneity. We first ran an unadjusted analysis in which the odds of restrictive practice were predicted based only on ethnic group. We then ran two adjusted analyses. The first adjusted analysis controlled for whether the service user had a primary diagnosis of psychosis; demographic factors gender, age group, and IMD rank; and factors pertaining to the nature of the incident, which were staff rated incident severity and incident type. The second adjusted analysis controlled for all these variables plus mental health act section status. We used mental health act status at the time of the incident as a proxy for the level of risk the service user presents to self and other.

RESULTS

Incident characteristics

Across the three years analysed, there were 10 515 incidents of inpatient violence or aggression involving a

patient. These incidents involved 2350 unique individuals. The distribution of incidents across service users was heavily skewed. The top 10% of service users most frequently involved in incidents accounted for 50% of total incidents, while bottom 40% of service users, who were involved in one incident each, accounted for just 9% of all incidents. Full tables of the results of the analyses can be found in Appendix 1.

Table 1 describes incident characteristics. Physical restraint without prone was the most common form of restrictive practice, used to manage 30.6% of incidents. Most incidents were categorized as severity 'D – Low' (41.6%) or 'C – Moderate' (40.3%). It is worth noting that there were almost as many challenging behaviours recorded as there were incidents of violence/aggression targeting staff. This broad category is comprised of incidents such as verbal assault and throwing objects aggressively. Due to the relatively low number of incidents categorized as damage to property, we combined these incidents with the 'Challenging Behaviour' category to create a baseline group of violent or aggressive incidents with no target recorded. Similarly, we combined incidents rated as category 'B – severe' with 'C – moderate' incidents to create a category of 'C and above'.

Service user characteristics

Table 2 provides a breakdown of service user characteristics, measured as a proportion of total incidents ($N = 10\,515$) and as a proportion of individual service users ($N = 2350$). Differences in the percentage breakdown of characteristics when measured by incidents (middle column) as compared to by service users (right column) occur because some categories of service users are more likely to be involved in multiple incidents of violence or aggression. For example, only 10.5% of service users involved in incidents were under the age of 18 yet 20.1% of all incidents involved this age group. This means this group was involved in multiple incidents more frequently than other age groups.

Table 3 shows a breakdown of incident severity by ethnic group. Proportionally, Black Caribbean service users had the fewest number of incidents rated as category C or above (33.8%), while Black African service has the most incidents recorded as category C or above (47.6%).

Physical restraint (with no prone position)

The unadjusted analysis suggested that Black Caribbean service users had lower odds of being physically

TABLE 1 Incident characteristics

	Incidents ($N = 10\,515$)
Physical restraint (without prone)	
No	7300 (69.4%)
Yes	3215 (30.6%)
Seclusion	
No	9054 (86.1%)
Yes	1461 (13.9%)
Prone restraint	
No	8965 (85.3%)
Yes	1550 (14.7%)
Rapid tranquilization	
No	8756 (83.3%)
Yes	1759 (16.7%)
Severity	
B – Severe	41 (0.4%)
C – Moderate	4235 (40.3%)
D – Low	4369 (41.6%)
E – No Adverse Outcome	1870 (17.8%)
Section type	
Informal	1656 (15.7%)
Section 2	3264 (31.0%)
Section 3	4496 (42.8%)
Other Section Type	1099 (10.5%)
Category	
Violence/aggression targeting staff	4067 (38.7%)
Challenging Behaviour	3974 (37.8%)
Violence/aggression targeting service users	2172 (20.7%)
Damage to property	302 (2.9%)

restrained without prone than white service users. However, this under-representation can be explained in terms of age differences. Service users under the age of 18 had over twice the odds of being physically restrained without prone [OR = 2.39, 95% CI: 1.91–2.98, $P < 0.001$]. A smaller proportion of the Black Caribbean service users involved in incidents were under the age of 18 (5.3%) relative to White service users (13.7%). Controlling for age, we found that Black Caribbean service users were not less likely to be physically restrained without prone than White service users.

Physical restraint (with prone position)

The unadjusted analysis suggested that Black Other, Black African, and Black Caribbean service users had higher of being restrained in prone position. However, differences in age group, socioeconomic deprivation, and psychosis explained the over-representation of Black African service users involved in prone restraint but only partially explained the over-representation of

TABLE 2 Characteristics of service users involved in incidents

	Incidents (N = 10 515)	Service users (N = 2350)
Ethnic group		
Asian	284 (2.7%)	75 (3.2%)
Black African	1777 (16.9%)	325 (13.8%)
Black	801 (7.6%)	207 (8.8%)
Caribbean		
Black Other	2501 (23.8%)	489 (20.8%)
Mixed	554 (5.3%)	93 (4.0%)
Not stated	298 (2.8%)	142 (6.0%)
Other	500 (4.8%)	128 (5.4%)
White	3800 (36.1%)	891 (37.9%)
Gender		
Female	4748 (45.2%)	962 (40.9%)
Male	5761 (54.8%)	1385 (58.9%)
Not stated/other	6 (0.1%)	3 (0.1%)
Age group		
Under 18	2116 (20.1%)	247 (10.5%)
18–25	2156 (20.5%)	460 (19.6%)
26–35	2529 (24.1%)	548 (23.3%)
36–45	1557 (14.8%)	417 (17.7%)
46–55	1017 (9.7%)	333 (14.2%)
56–65	521 (5.0%)	129 (5.5%)
65+	573 (5.4%)	177 (7.5%)
Not stated	46 (0.4%)	39 (1.7%)

TABLE 3 Incident severity by ethnic group

Incident Severity	E – No Adverse Outcome		C – Moderate and above
	D – Low		
Ethnic group			
Asian (N = 284)	42 (14.8%)	126 (44.4%)	116 (40.8%)
Black	158 (19.7%)	372 (46.4%)	271 (33.8%)
Caribbean (N = 801)			
Black African (N = 1777)	261 (14.7%)	670 (37.7%)	846 (47.6%)
Black Other (N = 2501)	435 (17.4%)	1052 (42.1%)	1014 (40.5%)
Mixed (N = 554)	85 (15.3%)	208 (37.5%)	261 (47.1%)
Not stated (N = 298)	52 (17.4%)	127 (42.6%)	119 (39.9%)
‘Other’ (N = 500)	103 (20.6%)	223 (44.6%)	174 (34.8%)
Ethnicity (N = 3800)			
White (N = 3800)	734 (19.3%)	1591 (41.9%)	1475 (38.8%)
Overall (N = 10 515)	1870 (17.8%)	4369 (41.6%)	4276 (40.7%)

Black Other service users. The odds of being subject to prone restraint were less than half for service users aged 65+ [OR = 0.43, 95% CI: 0.25–0.73, $P = 0.002$] relative to service users aged 26–35, while service users from less deprived areas had reduced odds of being subject to prone [OR = 0.83, 95% CI: 0.75–0.91, $P < 0.001$]. Service users with a primary diagnosis of psychosis had 22% higher odds of being subject to prone restraint [OR = 1.22, 95% CI: 1.00–1.50, $P = 0.049$]. A greater proportion of Black Other (64.4%) and Black African (70.2%) service users had a primary diagnosis of psychosis relative to White service users (33.9%). On average, Black Other service users [Mean = -0.18 , SD = 0.81] and Black African service users [Mean = -0.23 , SD = 0.83] had lower deprivation ranks than White service users [Mean = 0.17, SD = 1.13]. Fewer Black African (1.5%) and Black Other (1.6%) service users were aged 65+ relative to White service users (14.4%). The collective effect of Black African service users being younger, coming from more deprived areas, and suffering from psychosis more frequently, is that they are over-represented in prone restraint numbers. For Black Other service users, these factors only partially explained their over-representation in prone restraints and there was still a significant association [OR = 1.40, 95% CI: 1.07–1.82, $P = 0.013$]. Collectively, there was not a confounding effect of these factors for Black Caribbean service users, who still had 55% greater odds of being restrained in prone position in the adjusted model [OR = 1.55, 95% CI: 1.08–2.23, $P = 0.018$].

Service users recorded as ‘Other’ ethnic category had 58% greater odds of being = subject to prone restraint. There was a confounding effect of age. A smaller proportion of service users with Other ethnicity were aged over 65 (5.5%) relative to White service users (14.4%).

Seclusion

The unadjusted analysis suggested that Black Other and Black African service users had more than two times greater odds of being secluded than white service users. This over-representation was only partially explained by other factors, with Black African ethnicity [OR = 1.96, 95% CI: 1.36–2.83, $P < 0.001$] and Black Other ethnicity [OR = 1.76, 95% CI: 1.27–2.44, $P = 0.001$] service users still having nearly twice the odds of being secluded than white service users in the adjusted model. The main confounding effects in the adjusted analysis were due to age differences and

differences in incident severity. Incidents rated as category C or above had much higher odds of resulting in seclusion [OR = 7.09, 95% CI: 5.41–9.29, $P < 0.001$]. A greater proportion of incidents involving Black Other (40.5%) and Black African (47.6%) service users were category C and above, relative to White service users (38.8%). Furthermore, every age group above the 26–35 baseline group had reduced odds of being restrained and there were fewer Black African and Black Other service users in these age groups. These factors contribute to the over-representation of Black Other and Black African service users in seclusion numbers.

An opposite effect of age group was observed for Black Caribbean service users, who have an older age profile than White service users. Controlling for other variables revealed that Black Caribbean service users are also more likely to be secluded [OR = 1.76, 95% CI: 1.08–2.85, $P = 0.022$].

Service users with a Mixed ethnic background had nearly twice the odds of being secluded than White service users [OR = 1.89, 95% CI: 1.11–3.20, $P = 0.019$]. This was smaller than in the unadjusted analysis. The main confounding effect was of age, with more White service users occupying older age bands.

Rapid tranquilization

While the unadjusted model suggested that Black Other service users had greater odds of being rapidly tranquilized, the full model showed there was no association. This was due to confounding effects of age and socioeconomic status. Service users from less deprived areas had reduced odds of being rapidly tranquilized [OR = 0.84, 95% CI: 0.76–0.92, $P < 0.001$] and service users under the age of 18 and greatly reduced odds of being rapidly tranquilized [OR = 0.15, 95% CI: 0.10–0.22, $P < 0.001$]. Service users from Black Other service users were from more deprived areas [Mean = -0.18 , SD = 0.81] relative White service users [Mean = 0.17, SD = 1.13]. Proportionally fewer Black Other service users (7.2%) were under the age of 18 relative to White service users (13.7%).

Mental health act

Controlling for mental health act status in addition to the other confounding variables explained the over-representation of Black Other and Other ethnicity service users in prone restraint numbers. This was because service users on section 2 had three times

greater odds of being restrained in prone position [OR = 3.02, 95% CI: 2.31–3.94, $P < 0.001$]. A greater proportion of incidents involving Black Other (34.2%) and Other ethnicity (38.6%) service users occurred while they were under section 2, relative to White service users (24.6%). Controlling for mental health act status reduced the odds ratio for Black Caribbean service users from 1.55 to 1.45 [OR = 1.45, 95% CI: 1.02–2.07, $P = 0.040$].

Service users with no recorded ethnic group

Service users for whom no ethnic group had been recorded had greater odds of being secluded [OR = 3.28, 95% CI: 1.93–5.56, $P < 0.001$], subject to prone restraint [OR = 2.09, 95% CI: 1.36–3.22, $P = 0.001$], and rapidly tranquilized [OR = 1.56, 95% CI = 1.02–2.40, $P = 0.040$].

DISCUSSION

Our analysis suggests that at the time of these analyses, in the mental health trust under review, there were ethnic disparities in the way seclusion and prone restraint were used to manage incidents of violence or aggression in inpatient settings. People of Black Caribbean, Black African, Black Other, and Mixed ethnicities were more likely to be put into seclusion. People of Black Caribbean ethnicity were more likely to be subject to prone restraint. These effects are diminished but remain after controlling for confounding variables. We did not detect differences in the use of physical restraints without prone or in the use of rapid tranquilization.

Our findings are inconsistent with previous research using similar statistical methodology and data from two hospitals included in the present study, which found that the over-representation of Black service users in seclusion statistics was explained in terms of confounders (Gudjonsson *et al.* 2004). Although this previous study did not detect a statistical association between being Black and being secluded, the odds ratio was 1.6 with a wide confidence interval (95% CI 0.73–3.52), so it may be that the study lacked the power to detect a statistically significant effect. Our study analysed more incidents (10 515 compared to 1515), recorded across more settings, so had more statistical power to detect effects. Our findings are consistent with the results of the 2010 'Count me in' national census of psychiatric inpatients which found that Black Caribbean and Black African inpatients experienced

higher rates of seclusion than White patients (Care Quality Commission 2010).

The finding that Black Caribbean service users were more likely to be restrained in prone position is concerning, especially given the greater risk this position may pose to health and life (Kersting, Hirsch & Steinert 2019). National Institute for Health and Care Excellence (NICE) guidelines recommend against restraining service users in prone positions (NICE 2020) as do Mental Health Act Code of Practice guidelines (Department of Health 2015). Black Other service users were also more likely to be restrained in prone position if mental health act status was not controlled for.

A strength of our study is that it uses a large amount of data, with 10 515 incidents involving 2350 service users across multiple inpatient settings. This increased the statistical power of our study to detect effects and provides a broad picture of the use of restrictive practices across the Trust's inpatient settings. Furthermore, we controlled for multiple demographic variables and incident characteristics. We measured the rate of restraint as the number of restraints relative to the number of incidents of violence or aggression, rather than the inpatient population in general, as has been the case in some previous research. This means we can draw conclusions about whether differences in the application of restrictive practice arise once an incident has occurred. Finally, by controlling for patient-level random effects, our analysis accounts for individual patient heterogeneity which could bias an analysis of incident-level data alone. This is important given how heavily skewed involvement in incidents is, with relatively few service users accounting for a disproportionate number of total incidents.

Our study has several limitations. First, having no stated ethnic group was associated with increased odds of being subject to prone restraint, seclusion, and rapid tranquilization. If this group of service users is comprised mainly of Black or Minority Ethnic service users, then the effect of ethnicity on the likelihood of being restrained could be more pronounced. Given that the number of service users with no stated ethnicity was comparable some ethnic groups, this group could be large enough to risk invalidating our findings.

Second, to accommodate homeless service users in our proxy for socioeconomic status, we imputed the minimum Index of Multiple Deprivation rank for service users recorded as having no fixed abode. This assumes a homeless individual is as deprived as someone living in the most deprived area of England, when

in fact they are more deprived. This means our proxy for socioeconomic status suffers from a floor effect and may underestimate the effect of socioeconomic status on the odds of being subject to restrictive practice.

Thirdly, mental health act section status at the time of an incident was an important confounding variable in the relationship between Black Other ethnicity and the use of prone restraint. We can interpret mental health act status as a confounder if we think of it as a proxy measure of the risk the service user poses to self or others. However, being placed under section could also be causative because depriving service users of their liberty could produce distress and result in incidents that are more likely to end with restrictive practice. Since research shows Black service users are more likely to be formally detained (Barnett *et al.* 2019), this variable may be on the causal pathway between ethnicity and restrictive practice, meaning it is inappropriate to treat this as a confounder and it should be treated as a mediating variable. Future studies analysing the effect of mental health act status as a mediating variable will be necessary to tease out whether this is the case. If this were the case, the effect of being from Black ethnic groups on the odds of being restrained in prone position would be more pronounced in the present study.

Finally, our study does not elucidate underlying causal mechanisms through which a service user's ethnic background increases the odds of being subject to some forms of restrictive practice. We mainly controlled for socio-demographic variables, which do not capture the complexity of factors related to clinical severity and perceptions of risk. We also did not analyse the effects of staff-related factors, such as seniority, level of training, job role, or ethnic background. Previous research has highlighted the role of factors such as a lack of culturally appropriate services, a lack of cultural understanding, and communication issues in perpetuating ethnic disparities in mental health care (Grey *et al.* 2013). An analysis of mechanisms such as these will be important to inform the design of targeted policies to remove inequalities.

CONCLUSIONS

Our findings show there were no disparities in the way physical restraint and rapid tranquilization were used to manage incidents of violence or aggression in inpatient settings once important confounders such as age, incident severity, and socioeconomic status are accounted for. However, there were disparities in the

way seclusion and prone restraint were used, particularly for service users from Black ethnic backgrounds. Investigation into disparities further up the pathway to restrictive practice, including inequalities in the level of contact with community mental health services, rates of admission to psychiatric inpatient wards, rates of detention under the Mental Health Act, length of ward stays, and differences in the number of adverse incidents, is an important next step in fully understanding why proportionally more service users from some ethnic backgrounds are subject to restrictive practices in inpatient settings.

RELEVANCE FOR CLINICAL PRACTICE

Our study demonstrates there are ethnic disparities in the way some restrictive practices are used to manage incidents of violence or aggression in inpatient settings. Our study also demonstrates that age, incident severity, and having a psychosis diagnosis can confound the relationship between ethnic group and odds of being subject to restrictive practice. Mental Health Act status may also be a confounding variable, but future studies need to identify whether this factor sits along the causal pathway and is best treated as a mediating variable. These findings illuminate the need for mental health organizations to implement programmes to reduce the use of restrictive practice and to develop metrics to measure the success of these programmes in ensuring service users are treated equitably, with dignity and respect.

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ETHICAL APPROVAL

Ethical approval was received by the South London and Maudsley NHS Trust's ethical approval committee for clinical audits, service evaluations, and other quality improvement projects. The number/ID of the approval is PPF02102020B. The project was also approved by the Trust's Information Governance team.

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APPENDIX 1:

TABLE A1 Effects on physical restraint without prone position

Predictors	Unadjusted model			Adjusted model			Adjusted model + section status		
	Odds ratios	CI	P	Odds ratios	CI	P	Odds ratios	CI	P
(Intercept)	0.33	0.29–0.37	<0.001	0.20	0.16–0.25	<0.001	0.16	0.12–0.21	<0.001
<i>Ethnicity 'White'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Ethnicity 'Asian'	0.92	0.60–1.39	0.682	0.92	0.61–1.38	0.689	0.90	0.60–1.34	0.597
Ethnicity 'Black Caribbean'	0.75	0.57–0.98	0.035	0.84	0.65–1.10	0.215	0.83	0.63–1.08	0.162
Ethnicity 'Black African'	1.00	0.81–1.24	0.967	0.97	0.78–1.20	0.774	0.92	0.74–1.14	0.423
Ethnicity 'Black Other'	0.90	0.75–1.09	0.274	0.95	0.79–1.15	0.615	0.92	0.76–1.12	0.406
Ethnicity 'Mixed'	1.23	0.88–1.72	0.233	1.08	0.78–1.50	0.636	1.07	0.77–1.47	0.686
Ethnicity 'Not stated'	1.31	0.92–1.85	0.134	1.30	0.92–1.83	0.140	1.25	0.88–1.76	0.208
Ethnicity 'Other'	1.18	0.86–1.64	0.307	1.16	0.85–1.59	0.343	1.12	0.82–1.53	0.474
<i>Gender 'Male/Other'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Gender 'Female'				1.47	1.28–1.68	<0.001	1.44	1.25–1.65	<0.001
<i>Age Group '26–35'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Age Group 'Under 18'				2.32	1.86–2.89	<0.001	2.41	1.93–3.01	<0.001
Age Group '18–25'				1.01	0.83–1.22	0.919	1.00	0.82–1.21	0.968
Age Group '36–45'				0.93	0.75–1.14	0.476	0.94	0.77–1.16	0.578
Age Group '46–55'				0.87	0.69–1.11	0.271	0.87	0.68–1.11	0.263
Age Group '56–65'				0.79	0.57–1.10	0.169	0.80	0.58–1.11	0.177
Age Group '65+'				1.32	0.97–1.80	0.074	1.34	0.99–1.82	0.062
Age Group 'Not stated'				1.33	0.62–2.86	0.464	1.67	0.77–3.62	0.194
<i>Severity 'E'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Severity 'D'				1.03	0.89–1.19	0.705	1.03	0.89–1.19	0.680
Severity 'C+'				2.58	2.22–3.00	<0.001	2.56	2.21–2.98	<0.001
IMD Rank				0.97	0.90–1.03	0.331	0.98	0.92–1.05	0.539
<i>Category 'Challenging Behaviour/Property Damage'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Category 'Assault on Patient'				0.54	0.47–0.62	<0.001	0.55	0.47–0.63	<0.001
Category 'Assault on Staff'				1.10	0.99–1.24	0.080	1.11	0.99–1.24	0.065
<i>Primary diagnosis 'Not psychosis'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Primary diagnosis 'Psychosis'				0.96	0.83–1.11	0.556	0.94	0.81–1.09	0.444
<i>Informal</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Section Type 'Section 2'							1.50	1.25–1.80	<0.001
Section Type 'Section 3'							1.23	1.02–1.48	0.032
Section Type 'Other'							1.01	0.79–1.30	0.930
Random effects									
σ^2	3.29			3.29			3.29		
τ_{00}	0.87 _{TrustID}			0.66 _{TrustID}			0.63 _{TrustID}		
ICC	0.21			0.17			0.16		
N	2350 _{TrustID}			2350 _{TrustID}			2350 _{TrustID}		
Observations	10 515			10 515			10 515		
Marginal R ² /Conditional R ²	0.003/0.212			0.127/0.272			0.132/0.273		

Bold indicates statistical significance.

TABLE A2 Effects on seclusion

Predictors	Unadjusted model			Adjusted model			Adjusted model + section status		
	Odds ratios	CI	<i>P</i>	Odds ratios	CI	<i>P</i>	Odds ratios	CI	<i>P</i>
(Intercept)	0.03	0.02–0.04	<0.001	0.03	0.02–0.04	<0.001	0.02	0.01–0.04	<0.001
<i>Ethnicity 'White'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Ethnicity 'Asian'	1.18	0.56–2.47	0.659	0.82	0.40–1.70	0.599	0.81	0.39–1.67	0.566
Ethnicity 'Black Caribbean'	1.26	0.78–2.02	0.348	1.81	1.12–2.93	0.016	1.76	1.08–2.85	0.022
Ethnicity 'Black African'	2.61	1.81–3.76	<0.001	1.95	1.36–2.80	<0.001	1.96	1.36–2.83	<0.001
Ethnicity 'Black Other'	2.21	1.59–3.06	<0.001	1.79	1.29–2.49	<0.001	1.76	1.27–2.44	0.001
Ethnicity 'Mixed'	3.37	1.91–5.94	<0.001	1.89	1.12–3.21	0.018	1.88	1.11–3.18	0.019
Ethnicity 'Not stated'	3.79	2.20–6.55	<0.001	3.33	1.97–5.63	<0.001	3.28	1.93–5.56	<0.001
Ethnicity 'Other'	1.60	0.91–2.82	0.104	1.23	0.71–2.12	0.465	1.18	0.68–2.04	0.550
<i>Gender 'Male/Other'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Gender 'Female'				0.51	0.40–0.65	<0.001	0.53	0.41–0.67	<0.001
<i>Age Group '26–35'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Age Group 'Under 18'				3.38	2.38–4.80	<0.001	3.70	2.58–5.29	<0.001
Age Group '18–25'				0.82	0.60–1.11	0.189	0.84	0.62–1.14	0.269
Age Group '36–45'				0.66	0.48–0.92	0.015	0.65	0.46–0.90	0.010
Age Group '46–55'				0.34	0.22–0.52	<0.001	0.35	0.23–0.54	<0.001
Age Group '56–65'				0.12	0.05–0.27	<0.001	0.12	0.05–0.28	<0.001
Age Group '65+'				0.01	0.00–0.11	<0.001	0.02	0.00–0.12	<0.001
Age Group 'Not stated'				0.60	0.17–2.12	0.429	0.67	0.19–2.39	0.533
<i>Severity 'E'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Severity 'D'				1.67	1.27–2.19	<0.001	1.67	1.28–2.19	<0.001
Severity 'C+'				7.12	5.44–9.34	<0.001	7.09	5.41–9.29	<0.001
IMD Rank				0.86	0.77–0.97	0.014	0.86	0.76–0.97	0.012
<i>Category 'Challenging Behaviour/Property Damage'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Category 'Assault on Patient'				0.46	0.37–0.58	<0.001	0.48	0.38–0.60	<0.001
Category 'Assault on Staff'				1.45	1.23–1.71	<0.001	1.47	1.25–1.73	<0.001
<i>Primary diagnosis 'Not psychosis'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Primary diagnosis 'Psychosis'				0.86	0.66–1.10	0.225	0.87	0.67–1.12	0.283
<i>Informal</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Section Type 'Section 2'							1.09	0.83–1.43	0.518
Section Type 'Section 3'							0.85	0.64–1.13	0.272
Section Type 'Other'							1.82	1.26–2.61	0.001
Random effects									
σ^2	3.29			3.29			3.29		
τ_{00}	3.08 _{TrustID}			2.03 _{TrustID}			2.02 _{TrustID}		
ICC	0.48			0.38			0.38		
N	2350 _{TrustID}			2350 _{TrustID}			2350 _{TrustID}		
Observations	10 515			10 515			10 515		
Marginal R^2 /Conditional R^2	0.031/0.499			0.368/0.610			0.372/0.611		

Bold indicates statistical significance.

TABLE A3 Effects on physical restraint in prone position

Predictors	Unadjusted model			Adjusted model			Adjusted model + section status		
	Odds ratios	CI	<i>P</i>	Odds ratios	CI	<i>P</i>	Odds ratios	CI	<i>P</i>
(Intercept)	0.08	0.06–0.09	<0.001	0.11	0.08–0.15	<0.001	0.06	0.04–0.09	<0.001
<i>Ethnicity</i> 'White'	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Ethnicity 'Asian'	1.48	0.86–2.56	0.158	1.13	0.65–1.97	0.661	1.04	0.61–1.79	0.880
Ethnicity 'Black Caribbean'	1.58	1.11–2.24	0.011	1.55	1.08–2.23	0.018	1.45	1.02–2.07	0.040
Ethnicity 'Black African'	1.67	1.26–2.22	<0.001	1.33	0.99–1.79	0.062	1.16	0.87–1.55	0.320
Ethnicity 'Black Other'	1.79	1.40–2.30	<0.001	1.40	1.07–1.82	0.013	1.27	0.99–1.65	0.065
Ethnicity 'Mixed'	1.27	0.79–2.02	0.319	1.03	0.64–1.65	0.906	1.02	0.65–1.61	0.930
Ethnicity 'Not stated'	3.20	2.09–4.90	<0.001	2.33	1.51–3.61	<0.001	2.09	1.36–3.22	0.001
Ethnicity 'Other'	1.81	1.19–2.77	0.006	1.58	1.03–2.44	0.037	1.42	0.93–2.17	0.101
<i>Gender</i> 'Male/Other'				<i>Reference</i>			<i>Reference</i>		
Gender 'Female'				1.13	0.93–1.37	0.208	1.08	0.90–1.31	0.413
<i>Age Group</i> '26–35'				<i>Reference</i>			<i>Reference</i>		
Age Group 'Under 18'				0.85	0.62–1.18	0.335	0.98	0.71–1.35	0.901
Age Group '18–25'				1.58	1.22–2.04	0.001	1.52	1.18–1.96	0.001
Age Group '36–45'				1.08	0.82–1.44	0.583	1.12	0.85–1.48	0.426
Age Group '46–55'				1.09	0.79–1.51	0.586	1.12	0.81–1.53	0.495
Age Group '56–65'				0.68	0.43–1.08	0.105	0.73	0.46–1.15	0.171
Age Group '65+'				0.40	0.23–0.68	0.001	0.43	0.25–0.73	0.002
Age Group 'Not stated'				0.64	0.20–2.07	0.454	1.26	0.39–4.05	0.703
<i>Severity</i> 'E'				<i>Reference</i>			<i>Reference</i>		
Severity 'D'				0.60	0.50–0.73	<0.001	0.61	0.50–0.74	<0.001
Severity 'C+'				1.70	1.39–2.06	<0.001	1.67	1.37–2.03	<0.001
IMD Rank				0.80	0.72–0.88	<0.001	0.83	0.75–0.91	<0.001
<i>Category</i> 'Challenging Behaviour/Property Damage'				<i>Reference</i>			<i>Reference</i>		
Category 'Assault on Patient'				0.17	0.13–0.22	<0.001	0.17	0.14–0.22	<0.001
Category 'Assault on Staff'				0.75	0.65–0.87	<0.001	0.76	0.66–0.88	<0.001
<i>Primary diagnosis</i> 'Not psychosis'				<i>Reference</i>			<i>Reference</i>		
Primary diagnosis 'Psychosis'				1.24	1.01–1.52	0.044	1.22	1.00–1.50	0.049
<i>Informal</i>							<i>Reference</i>		
Section Type 'Section 2'							3.02	2.31–3.94	<0.001
Section Type 'Section 3'							1.41	1.06–1.87	0.017
Section Type 'Other'							1.39	0.98–1.99	0.068
<i>Random effects</i>									
σ^2	3.29			3.29			3.29		
τ_{00}	1.57	TrustID		1.43	TrustID		1.25	TrustID	
ICC	0.32			0.30			0.28		
N	2350	TrustID		2350	TrustID		2350	TrustID	
Observations	10 515			10 515			10 515		
Marginal R^2 /Conditional R^2	0.017/0.335			0.157/0.413			0.189/0.413		

Bold indicates statistical significance.

TABLE A4 Effects on rapid tranquilization

Predictors	Unadjusted model			Adjusted model			Adjusted model + section status		
	Odds ratios	CI	P	Odds ratios	CI	P	Odds ratios	CI	P
(Intercept)	0.12	0.10–0.14	<0.001	0.21	0.15–0.28	<0.001	0.10	0.07–0.15	<0.001
<i>Ethnicity 'White'</i>	<i>Reference</i>			<i>Reference</i>			<i>Reference</i>		
Ethnicity 'Asian'	1.43	0.82–2.49	0.213	1.04	0.60–1.78	0.893	0.93	0.55–1.58	0.798
Ethnicity 'Black Caribbean'	1.08	0.75–1.56	0.680	0.94	0.65–1.34	0.723	0.87	0.61–1.23	0.434
Ethnicity 'Black African'	1.32	0.98–1.76	0.067	1.01	0.76–1.36	0.932	0.86	0.65–1.15	0.309
Ethnicity 'Black Other'	1.38	1.07–1.79	0.014	1.02	0.79–1.32	0.894	0.91	0.71–1.17	0.460
Ethnicity 'Mixed'	0.74	0.45–1.23	0.248	0.65	0.40–1.06	0.084	0.64	0.40–1.03	0.067
Ethnicity 'Not stated'	2.67	1.71–4.17	<0.001	1.71	1.11–2.65	0.015	1.56	1.02–2.40	0.040
Ethnicity 'Other'	1.09	0.70–1.72	0.697	0.95	0.62–1.48	0.833	0.82	0.54–1.26	0.368
<i>Gender 'Male/Other'</i>				<i>Reference</i>			<i>Reference</i>		
Gender 'Female'				1.59	1.31–1.92	<0.001	1.50	1.25–1.81	<0.001
<i>Age Group '26–35'</i>				<i>Reference</i>			<i>Reference</i>		
Age Group 'Under 18'				0.13	0.09–0.19	<0.001	0.15	0.10–0.22	<0.001
Age Group '18–25'				1.35	1.05–1.74	0.019	1.30	1.02–1.66	0.036
Age Group '36–45'				0.94	0.72–1.23	0.658	0.98	0.75–1.27	0.875
Age Group '46–55'				1.02	0.75–1.39	0.886	1.05	0.77–1.41	0.766
Age Group '56–65'				0.72	0.47–1.12	0.141	0.78	0.51–1.19	0.243
Age Group '65+'				0.59	0.38–0.93	0.023	0.67	0.43–1.04	0.075
Age Group 'Not stated'				0.51	0.17–1.55	0.235	1.23	0.41–3.69	0.717
<i>Severity 'E'</i>				<i>Reference</i>			<i>Reference</i>		
Severity 'D'				0.70	0.58–0.84	<0.001	0.70	0.58–0.84	<0.001
Severity 'C+'				2.05	1.69–2.48	<0.001	2.01	1.66–2.44	<0.001
IMD Rank				0.80	0.73–0.88	<0.001	0.84	0.76–0.92	<0.001
<i>Category 'Challenging Behaviour/Property Damage'</i>				<i>Reference</i>			<i>Reference</i>		
Category 'Assault on Patient'				0.15	0.12–0.18	<0.001	0.15	0.12–0.19	<0.001
Category 'Assault on Staff'				0.51	0.44–0.59	<0.001	0.52	0.45–0.60	<0.001
<i>Primary diagnosis 'Not psychosis'</i>				<i>Reference</i>			<i>Reference</i>		
Primary diagnosis 'Psychosis'				1.23	1.00–1.50	0.046	1.21	1.00–1.48	0.052
<i>Informal</i>							<i>Reference</i>		
Section Type 'Section 2'							3.96	3.00–5.21	<0.001
Section Type 'Section 3'							1.64	1.23–2.19	0.001
Section Type 'Other'							1.73	1.22–2.44	0.002
<i>Random effects</i>									
σ^2	3.29			3.29			3.29		
τ_{00}	2.07 _{TrustID}			1.57 _{TrustID}			1.32 _{TrustID}		
ICC	0.39			0.32			0.29		
N	2350 _{TrustID}			2350 _{TrustID}			2350 _{TrustID}		
Observations	10 515			10 515			10 515		
Marginal R^2 /Conditional R^2	0.009/0.392			0.210/0.465			0.256/0.469		

Bold indicates statistical significance.