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Socioeconomic Deprivation Influences Failure to Attend Arranged Orthopaedic Outpatient Appointments as Well as Access to and Engagement With Health Care

A Cohort Study

V. Badial, MBBS*, S.F. Turner, BSc*, H. Jeffrey, MRCS, R. Barter, MRCS, E. Hayter, MRCS, and R.E. Anakwe, FRCS Ed(Tr&Orth)

Investigation performed at Imperial College Healthcare NHS Trust, London, United Kingdom

Background: We undertook this study to examine the "did-not-attend" (DNA) rate for the orthopaedic outpatient clinic at a large tertiary center, to understand the influencing factors and reasons from the patient perspective and to determine the impact of socioeconomic deprivation.

Methods: We reviewed all scheduled outpatient attendances to our trauma and orthopaedic surgery service over a 12-month period and demographic information for each patient, including the Index of Multiple Deprivation. We studied the rate and predictors for nonattendance in the outpatient clinic and the influence of socioeconomic deprivation. We undertook a secondary study to evaluate the reasons patients gave for nonattendance, their perception of the accessibility, usefulness, and format of the outpatient model and any relationship with socioeconomic deprivation

Results: Eighteen thousand thirty-three patients attended 58,396 outpatient appointments over the 12-month study period. 2060 patients "did not attend" at least one arranged orthopaedic outpatient appointment over the 12 months of the study period. Men and more socioeconomically deprived patients were more likely to not attend. The most common reasons given for not attending were that patients did not feel that the appointment was useful for them. Patients from socioeconomically deprived groups were more likely to reference transport difficulties as a reason for not attending ($p < 0.001$). Socioeconomically deprived and disadvantaged patients reported poorer satisfaction scores regarding how able they felt to access orthopaedic help and services when they needed to and how able they felt to access orthopaedic help and services in a way that suits them.

Conclusions: Socioeconomic deprivation affects health and access to health care. Patients who are more socioeconomically deprived are more likely to not attend, and they report poorer satisfaction with access to orthopaedic outpatient care. DNA rates may reflect underlying health disparities.

Level of Evidence: Level II. See Instructions for Authors for a complete description of levels of evidence.

Introduction

When patients "do not attend" (DNA) outpatient appointments without prior arrangement or notification, this represents a wasted opportunity for healthcare treatment or intervention. There is an obvious financial and efficiency incentive to minimize the number of DNA appointments in a healthcare system. The missed opportunity to address a healthcare need or to make an intervention would suggest that there is also a quality and patient safety impact.

A number of studies have looked at the reasons why patients "DNA" outpatient appointments. Some of these reasons relate to the personal circumstances of the patient and the process

*V. Badial and S.F. Turner are recognized as joint first authors

All authors contributed equally to this work

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and setup of the outpatient system[1-3]. There is evidence that socioeconomic deprivation influences this in some cases[1,2,4,5].

Patients who are unable to access advice and care in a timely way may suffer long-term harm in the form of pain and disability, affecting on the ability to work or to participate and function in routine activities of daily living[6,7].

We undertook this study to describe and define the patient cohort who "DNA" arranged orthopaedic outpatient appointments in our tertiary center. We hypothesized that older age, male sex, greater socioeconomic deprivation, and minority ethnicity and race would be important predictors for patients who did not attend the outpatient clinic. We further hypothesized that the reasons given by patients as to why they had not attended their planned orthopaedic outpatient appointment would vary and might be associated with their level of socioeconomic deprivation.

Materials and Methods

We prospectively identified all patients scheduled to attend an outpatient clinic appointment with our trauma and orthopaedic surgery service over a 12-month period between April 1, 2023, and March 31, 2024. We included adult patients aged 18 years and older. Demographic information, including age, sex, and ethnicity, was collected from the patient record. Socioeconomic deprivation was determined using the Index of Multiple Deprivation (IMD), a nationally validated and geographically based measure of deprivation[8]. The IMD combines information from 7 domains: income, employment, education, health, crime, housing, and living environment. The IMD assigns a deprivation rank, between 1 and 32,844 to distinct geographic areas across the country, based on the postcode. Each rank includes approximately 1,500 people and is commonly aggregated into deciles for analysis. Lower IMD ranks and deciles indicate greater socioeconomic deprivation[8,9].

Our unit is a tertiary academic unit serving a metropolitan area with 1.5 million residents. It hosts a regional major trauma center and regional services for complex trauma, trauma reconstruction, and bone/soft tissue infection. The socioeconomic profile of our patient population includes areas of the most extreme deprivation and poverty (IMD rank 3,035) in close juxtaposition to some of the most affluent areas of the country (IMD rank 28,407)[8,9].

Our unit is served by 2 emergency departments where all urgent and emergent patients are initially assessed. Patients who are not identified as requiring urgent surgical intervention or treatment would normally be discharged with an arrangement for outpatient follow-up within 2 weeks. Urgent referrals are also received for fractures or other urgent concerns from primary care teams and from neighboring hospitals and orthopaedic units. In addition, a large volume of planned elective outpatient is treated in our unit in all subspecialty areas with the exception of tumor surgery.

Patients were grouped and considered in 1 of 2 groups based on the clinical urgency of the presentation and on their clinical pathway. These groups were either acute care and trauma or planned elective care. Acute and trauma cases include patients referred for follow-up after discharge from the emergency department and those referred by primary care or other centers for urgent issues. Elective cases included planned appointments for chronic conditions or prescheduled for nonurgent, chronic issues or elective treatment.

Patients were recorded as either attending or not attending their scheduled appointments. For our primary analysis, we used a mixed-effects logistic regression model to evaluate the association between demographic, socioeconomic, and clinical variables with the likelihood that a patient would not attend. The dependent variable was binary (1 = DNA, 0 = attended), with age, sex, IMD rank, and patient group/appointment type included as fixed predictors. The patient identification number was incorporated as a random intercept to account for repeated measures. The model showed good discriminative ability, with an area under the curve for the receiver operating characteristic (ROC-AUC) of 0.82. Fit statistics, including -2 Log Likelihood (2,125.3), Akaike Information Criterion (AIC) 2,131.3, and Bayesian Information Criterion (BIC) 2,145.6, indicate a well-fitting model. The results are presented as odds ratios (OR) with 95% confidence intervals (CI).

We contacted nonattenders through email and followed up with telephone or text message reminders to invite them to participate in the secondary study and analysis and to complete a short questionnaire (Appendix A). Nonresponders were sent the questionnaire by post. The questionnaire confirmed patient age, sex, and the reasons for nonattendance. Patients were asked to self-define their racial/ethnic background selecting from categories set out in guidance from the Office for National Statistics and recommended for research, surveys, and projects aiming to measure equality[10,11].

Patients were asked to report their reasons for not attending and their level of satisfaction with access to the service which was measured using a visual analog scale (VAS) scaled from 0 (very dissatisfied) to 100 (very satisfied). Patient satisfaction was evaluated in 3 domains: ability to access orthopaedic services when needed, ability to access services in a way that suits them, and ease of scheduling and managing appointments. We correlated these results with socioeconomic deprivation measured using the IMD.

The primary outcome measures were patient age, sex, IMD rank, and race/ethnicity for those patients who "did not attend" and those factors which were predictive in our model. Secondary outcome measures were the reasons given by patients why they did not attend their appointment, reported levels of satisfaction, and any association with patient age, sex, ethnicity, or socioeconomic deprivation. The study was approved by our institutional review board.

Statistical Analysis

Statistical analyses were performed using SPSS 29.0 software (SPSS Inc). Descriptive statistics were reported as means (standard deviation) for continuous variables and percentages for categorical variables. Continuous variables were tested for normality using histograms and the Shapiro-Wilk test. Comparisons between groups were performed using chi-square tests for categorical variables and t-tests or Mann-Whitney U tests for continuous variables, as appropriate. Correlations were assessed using the Spearman rho. Statistical significance was set at $p < 0.05$.

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Results

In total, 18,033 patients attended 58,396 outpatient appointments in the trauma and orthopaedic surgery service over the 12-month study period. 10,023 (56%) were women. 3,271 outpatient appointments were unused over the 12-month study period as patients "DNA", representing a rate of wastage of 5.6%. A total of 2,060 individual patients did not attend at least 1 scheduled appointment, representing a DNA rate of 11.4% among individual patients. 1,258 patients (61%) were men. 1,211 patients "DNA" more than 1 outpatient appointment.

Men were more likely than women to not attend (OR = 1.522, 95% CI: 1.165-1.987, p = 0.002). Older patients were less likely to not attend (OR = 0.985, 95% CI: 0.975-0.995, p = 0.003). Greater socioeconomic status (higher IMD rank) was associated with reduced likelihood for DNA (OR = 0.980, 95% CI: 0.972-0.988, p < 0.001), and patient group/appointment type (acute or trauma vs planned elective care) did not show any significant association with the likelihood that a patient would not attend (OR = 0.896, 95% CI: 0.770-1.042, p = 0.190) (Table I).

One thousand five hundred fifty-one (75%) of the nonattenders agreed to participate in the secondary study and completed the questionnaire. Patient age, sex, and socioeconomic deprivation were compared between patients who agreed to participate and those patients who were nonresponders or who chose not to participate. There were no significant differences between the groups for these parameters. 899 (58%) of the nonattenders were men. The women were older than the men (mean age 51.5 vs 42.5 years, p < 0.001 (Table II)). Nine hundred thirty-two patients (60%) were scheduled to attend for treatment of a suspected or confirmed fracture or an acute injury while the rest of the patients had been scheduled to attend an outpatient appointment for planned elective care.

Five hundred twelve patients (33%) reported that they did not attend because they did not feel that the appointment was useful to them. This was the most common reason given (Fig. 1). Socioeconomically deprived patients (lower IMD ranks) were more likely to report transport difficulties as a reason for nonattendance (Spearman rho −0.174, 95% CI −0.237 to −0.109, p < 0.001). Patients who were less socioeconomically deprived were more likely to report that they had obtained care elsewhere, either through public-funded services (Spearman rho 0.062, 95% CI 0.02-0.433, p < 0.05) or private/self-funded care (Spearman rho 0.085, 95% CI 0.019-0.15, p < 0.05) (Fig. 1). Older patients were also more likely to have sought private/self-funded care (Spearman rho 0.066, 95% CI 0.03-0.353, p < 0.05) (Table III).

Satisfaction scores, assessed using the VAS, were significantly lower among more socioeconomically deprived patients regarding their ability to access orthopaedic services when needed (Spearman rho 0.330, 95% CI 0.270-0.388, p < 0.001) and their ability to access services in a way that suits them (Spearman rho 0.378, (95% CI 0.32-0.433, p < 0.001) (Table IV).

Conclusion

Our study showed that men were more likely to fail to attend an arranged outpatient appointment than women

TABLE I Binary Logistic Regression Outputs Predicting Likelihood of Patient Not Attending

Predictor	B	SE	Wald χ^2	df	p	ExpB (OR)	95% CI (OR)
Intercept	−2.450	0.180	185.00	1	<0.001		
Age	−0.015	0.005	9.00	1	0.003	0.985	0.975-0.995
Sex (Men)	0.420	0.140	9.00	1	0.002	1.522	1.165-1.987
IMD rank	−0.020	0.004	25	1	<0.001	0.980	0.972-0.988
Patient group/appointment type (Acute/Trauma)	−0.110	0.080	1.90	1	0.190	0.896	0.770-1.042
Random Effects	**Variance Estimate**				**SE**		
Effect							
Patient number	0.430				0.065		
Model Fit					**Value**		
-2 Log likelihood					2,125.3		
AIC					2,131.3		
BIC					2,145.6		
ROC-AUC					0.82		

IMD = Index of Multiple Deprivation.

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TABLE II Patient Demographics for Patients Who Did Not Attend and Who Responded to the Patient Questionnaire

	Total	Men	Women	
n (%)	1,551 (100)	899 (58)	652 (42)	
Age, mean (SD) (years)		42.5 (SD 18.262)	51.4 (SD 20.262)	p < 0.001
Ethnicity				p = 0.45
White	656 (42.3%)	343	313	
Black	742 (47.8%)	455	287	
Asian	133 (8.6%)	87	46	
Mixed	17 (1.1%)	11	6	
Other	3 (0.2%)	3	0	
Socioeconomic status IMD rank median (SD)		17,568 (SD 7525.78)	17,534 (SD 7581.80)	p = 0.966
Socioeconomic status IMD decile median (SD)		6 (SD 2.30)	6 (SD 2.34)	p = 0.963
Patient distribution by IMD decile n (%)				
1	121 (7.8)	60 (6.7)	61 (9.4)	
2	161 (10.4)	104 (11.6)	57 (8.7)	
3	193 (12.4)	111 (7.2)	82 (12.6)	
4	220 (14.2)	121 (7.8)	99 (15.2)	
5	244 (15.7)	123 (7.9)	121 (18.6)	
6	210 (13.5)	141 (9.1)	69 (10.6)	
7	128 (8.3)	64 (4.1)	64 (9.8)	
8	108 (7)	71 (4.6)	37 (5.7)	
9	86 (5.5)	53 (3.4)	33 (5.1)	
10	80 (5.2)	51 (3.3)	29 (4.4)	

IMD = Index of Multiple Deprivation.

and that socioeconomically disadvantaged patients were also more likely to fail to attend in this way. Our study did show that over half of the patients who "DNA" classified themselves as from a "Black, Asian, or Mixed" ethnic background, but there was no demonstrable association between race and ethnicity and the reasons given by patients for not attending or their reported levels of satisfaction.

Race and ethnicity are recognized as important factors in healthcare accessibility[12,13]. Several studies have detailed differences in healthcare utilization between ethnic groups[14,15], with ethnic minority groups often experiencing lower rates of outpatient clinic attendance compared with White patients[16]. These differences have been attributed to a number of factors, including systemic racism[17], cultural barriers[18], and differences in health literacy[19]. Routine recording of reliable demographic data is important to allow services to fully explore and understand patient expectations, behaviors, and the influence of race and culture.

Older and socioeconomically advantaged patients were more likely to have obtained treatment elsewhere. This may represent greater heath awareness, access, or opportunity to access and to prioritize health advice and health care for these patient groups. This is important as our study shows that socioeconomically disadvantaged patients reported that they did not feel they were able to access orthopaedic help and services in a way that suited them.

Socioeconomically disadvantaged patients in our study were more likely to report that they did not attend their appointment because it was not valuable to them. This underlines the point that patients actively choose to engage with healthcare services that are relevant and important to them. Socioeconomically disadvantaged patients in our study were also more likely to cite challenges with transport as a reason for nonattendance. The region and unit are served with excellent travel links by metro, rail, or road, and average travel times for patients range between 40 to 60 minutes for a single leg journey. Free hospital transportation is provided based on national eligibility guidance related to the need for clinical assistance or support during the journey but is not allocated on socioeconomic status or the ability to pay.

The reasons for patient choice and for nonattendance are broader than just health need. There is evidence that uninsured patients are significantly less likely to receive timely orthopaedic surgery compared with insured patients[20]. Specifically, there is also good evidence that patients from minority ethnic groups undergo lower rates of total joint arthroplasty surgery compared with White patients, despite similar levels of clinical need[21] and have poorer postoperative outcomes following a range of treatments[20,22-26]. These disparities in healthcare utilization may likely, at least in part, represent an inequity in healthcare access.

Unused outpatient appointments are often viewed through the lens of efficiency and service demand. They are a waste of resources with an obvious financial and service implication.

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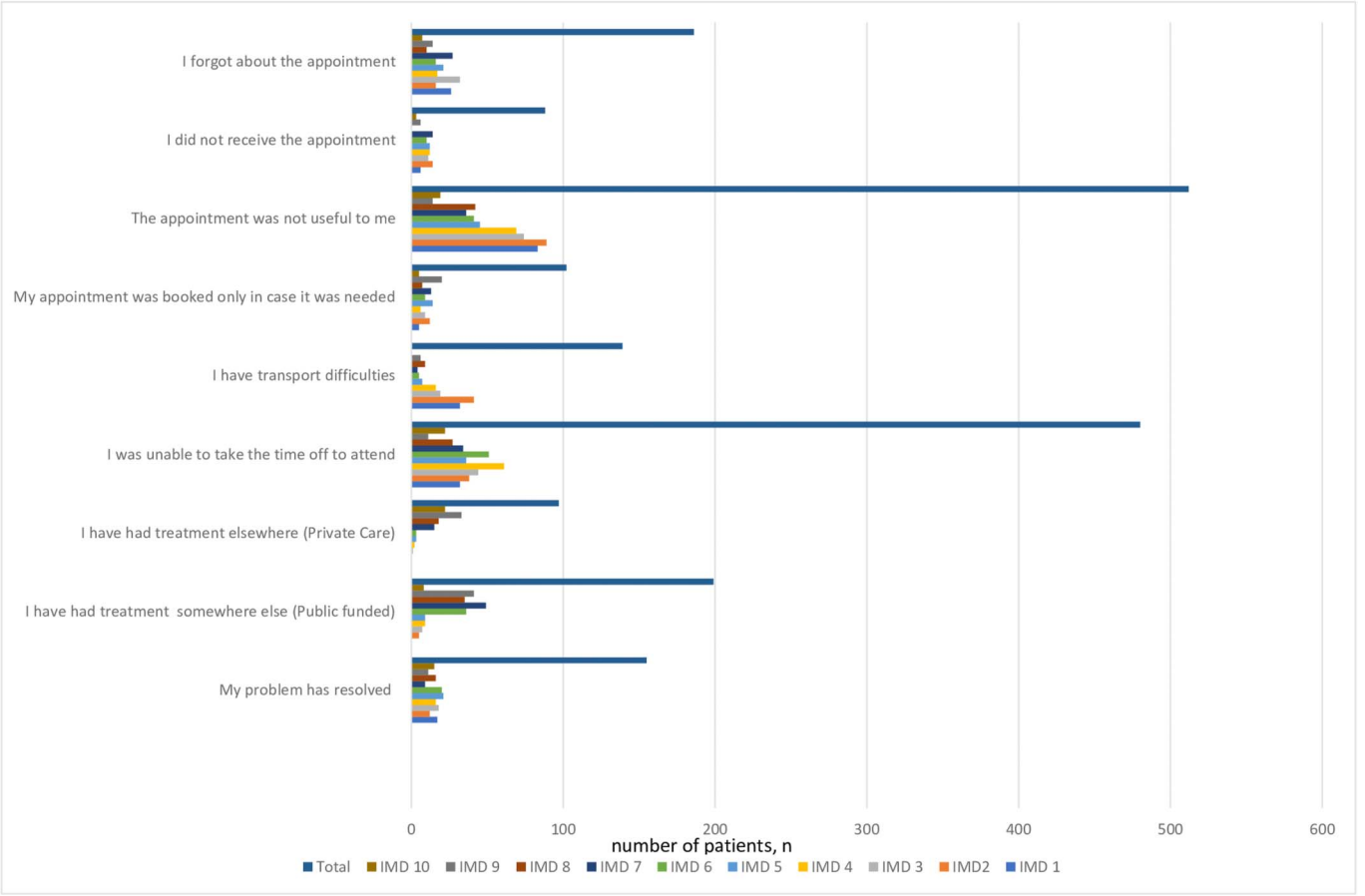

Fig. 1

Reasons given for nonattendance by socioeconomic deprivation (IMD grouped by decile). IMD = Index of Multiple Deprivation.

Suggested solutions include telephone or text message reminders to encourage attendance or deliberate overbooking to maximize capacity[27]. Our study provides evidence that appointments where patients do not attend should also be viewed as missed opportunities to improve quality and equity of care.

Previous studies have examined the impact of demographic, geographic and socioeconomic factors on the utilization, accessibility, and perception of health care in different settings. Race, ethnicity, and socioeconomic factors have been particularly studied and have been shown to be important influencing

TABLE III Correlation Between Socioeconomic Status (IMD Rank) and Reasons Given by Patients for Not Attending Their Outpatient Appointment Spearman Rank Correlation

Reason Given by Patients	Correlation Coefficient	95% CI	p
My problem has resolved	0.049	−0.017 to 0.114	0.138
I have had treatment somewhere else (NHS/Public funded)	0.062	0.02 to 0.433	<0.05
I have had treatment somewhere else (Private/Self-funded)	0.085	0.019 to 0.15	0.009
I was unable to take the time off to attend	−0.015	−0.081 to 0.051	0.651
I have transport difficulties	−0.174	−0.237 to 0.109	<0.001
My appointment was booked only in case it was needed	0.056	−0.01 to 0.121	0.089
The appointment was not useful to me	−0.057	−0.122 to 0.009	0.082
I did not receive the appointment	0.054	−0.01 to 0.118	0.096

IMD = Index of Multiple Deprivation.

TABLE IV Correlation Between Socioeconomic Status (IMD Rank) and Patient Satisfaction

Satisfaction Domain	Correlation Coefficient	95% CI	p
Ability to access orthopaedic help and services when you need them	0.330	0.270 to 0.388	<0.001
Ability to access orthopaedic help and services in a way that suits you	0.378	0.320 to 0.433	<0.001
Ability to make change and check appointments with the clinic team	−0.028	−0.093 to 0.038	0.399

IMD = Index of Multiple Deprivation. Spearman rank correlation.

factors[28-30]. Our study supports the premise that some patients may not attend planned healthcare appointments because of practical and "real-life" barriers such as transport or because of competing priorities. Most patients who "DNA" reported that they did not feel that the appointment added value for them. There may be value in undertaking work to set out why a patient is being offered an outpatient appointment and then communicating this to the patient and team so that the value and expectation of the encounter is established. If there are a large number of outpatient visits that are genuinely not offering value for the patient, then this may represent an opportunity to improve productivity and efficiency also. It would have been informative to offer some further detail to assess the severity or acuity of the conditions for which patients were being treated. We were unable to reliably assess this is 1 area that could usefully be addressed by a future study.

We have adopted a number of measures to further understand this challenge. We have moved away from blanket policies to routinely discharge patients "who DNA". Instead, each patient record is reviewed by the senior attending surgeon to consider if and when a further appointment should be offered. We ensure that communication is attempted with the patient and their primary care physician and, in some circumstances, will offer an open-ended but time-limited offer of patient-initiated follow-up. There is a general move to offer more community-based appointments and services, and this may help to reduce the burden of travel for patients. No single measure is likely to address this fully, but attempts to make our services more flexible and accommodating for patients and to improve our communication and scheduling are welcomed.

There are a number of limitations to our study. Accurate data quality and recording are important for any demographic analysis. Our prospective design mitigates for this. 25% of the eligible patient group did not participate in the study. It is not possible to fully discount the potential for selection bias, but our analysis showed that there was no significant difference between participants and nonresponders when age, sex, and socioeconomic deprivation were considered. There is also the potential for confounding and the influence of factors, which have not been measured or considered.

Our study provides evidence that, from the patient perspective, the accessibility of services is important, but this is not the only factor which affects utilization of healthcare services and health equity. The availability, acceptability, and quality of healthcare services as well as the perception of these factors also need to be considered. If we are to make meaningful steps toward reducing health inequalities, then it is important for healthcare planners and providers to consider, understand, and plan for those patients who attend the outpatient clinic but also to consider those patients who do not. There is already good evidence that socioeconomic deprivation affects the outcomes of treatment in a number of areas[13,14,17] and, also specifically, of orthopaedic care[20-26]. Our study suggests that health inequalities exist at a more basic and systemic level in that they influence who is able to or who chooses to access and obtain high-quality healthcare advice and treatment from the outset.

Appendix

eA Supporting material provided by the author is posted with the online version of this article as a data supplement at jbjs.org (http://links.lww.com/JBJSOA/A809). This content has not been copyedited or verified. ■

V. Badial, MBBS[1,2]
S.F. Turner, BSc[1,2]
H. Jeffrey, MRCS[1]
R. Barter, MRCS[1]
E. Hayter, MRCS[1]
R.E. Anakwe, FRCS Ed(Tr&Orth)[1,2]

[1]Department of Trauma and Orthopaedic Surgery, St Mary's Hospital Imperial College Healthcare NHS Trust, London

[2]Imperial College, London

E-mail address for R.E. Anakwe: raymond.anakwe@nhs.net

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