TITLE PAGE

Title

Do practice deprivation scores predict declines in perceived relationship continuity? A longitudinal study

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ABSTRACT

Background

Increased relationship continuity in primary care is associated with better health outcomes, greater patient satisfaction and fewer hospital admissions. Greater socio-economic deprivation is associated with lower levels of continuity, as well as poorer health outcomes.

Aim

To investigate whether deprivation scores predicted variations in the decline over time of patient-perceived relationship continuity of care, after adjustment for practice organisational and population factors.

Design and Setting

Observational study. Longitudinal multilevel linear model for 2012-2017 inclusive; 6,243 practices in England with more than one GP.

Methods

Relationship continuity was calculated using two questions from the General Practice Patient Survey. The effect of deprivation on the linear slope of continuity over time was modelled, adjusting for nine confounding variables (practice population and organisational factors). Clustering of measurements within general practices was adjusted for by modelling general practice as a random effect, using a random intercepts and random slopes model. Descriptive statistics and univariable analyses were also undertaken.

Results

Continuity declined by 27.5% between 2012 and 2017 and at all deprivation levels. Deprivation scores from 2012 did not predict variations in the decline of relationship continuity at practice level, after accounting for the effects of organisational and population confounding variables, which themselves did not predict (smokers, permanent disability and geographical location), or weakly predicted (Black or South Asian ethnicity, list size, over 75s, long-term conditions) with very small effect sizes, the decline of continuity. Cross-sectionally, continuity and deprivation were negatively correlated within each year.

Conclusion

Deprivation scores did not predict decline in relationship continuity over time, which is persistent and widespread in English primary care.

KEYWORDS

Continuity of Patient Care; Primary Health Care; Socioeconomic Factors

HOW THIS FITS IN

In this longitudinal observational study, deprivation scores did not predict variations in the decline of relationship continuity of care (as measured by the General Practice Patient Survey) between 2012 and 2017 at practice level, after accounting for the effects of confounding variables. These confounders did not predict, or only weakly predicted decline in continuity with very small effect sizes. Continuity declined slightly more in practices with higher percentages of over 75s or of those with chronic illness. This decline coincides with lengthening waiting times for routine GP appointments and increasing non-elective hospital admissions. The contractual return to a named doctor has, so far, not led to improved continuity.

MAIN TEXT

INTRODUCTION

Halting the persistent and widespread decline of continuity of care[1] is a challenge for English general practices. Continuity of care is generally regarded as a key feature and probable strength of primary care globally[2]. Although researchers recognise several different types of continuity, it has two complementary essential elements: the on-going relationship between an individual and a clinician (known as 'relationship' continuity), and the coordinated clinical care that progresses smoothly as the individual moves between different parts of the healthcare system (known as 'management' continuity)[3]. Relationship continuity is generally valued both by clinicians[4] and by patients[5], especially those who are older or who have complex or worrying health problems[6-7].

The benefits of increased relationship continuity include a more holistic approach to care[8], better recognition of some health problems[9], better concordance with medication regimes[10], better uptake of preventive services[11], and more cost-effective use of healthcare resources[12-14], including reduced hospital admission rates[15]. However, the potential harms of continuity include increased staff costs to deliver it[2], potential collusion with less adherence to professional standards and guidelines[16-17], and lacking a fresh perspective[8] that may cause diagnostic delay[18-19].

Aiming largely to reduce hospital admissions, the general medical services contract (GMS) was amended in 2014-2015, requiring all patients aged 75 years old and over to be provided with a named accountable general practitioner (GP), working with other professionals to 'deliver a multi-disciplinary care package' and to ensure access to a health check. From 2015-2016, all patients were required to have a named accountable GP, to take 'lead responsibility for the coordination of all services required under the contract'[20]. In the first 9 months after these were introduced there was no improvement in continuity[21].

Socio-economic deprivation measures the disadvantage of an individual or group relative to the local community or wider society[22], and, thus, is an indicator of socio-economic position. Across the world, those who are disadvantaged in this way suffer higher rates of adverse health problems, such as suicide, heart disease, lung disease, obesity and diabetes, and are more likely to have shorter lives[23].

The Royal College of General Practitioners (RCGP) has compared continuity of care between Clinical Commissioning Groups (CCGs)[24]. In CCGs with higher levels of deprivation, patients are less likely to have a preferred GP; the RCGP also found a weak negative correlation between being able to see a preferred GP (if the patient had one) and deprivation. However, some patients are more successful at obtaining continuity than others[25].

Practices based in more deprived areas appear to have higher workloads than those in more affluent areas[26]. For busier practices, providing adequate access to services could have an adverse impact on relationship continuity. Thus, we wanted to explore the possible longitudinal association between deprivation and continuity. The research question was: do deprivation scores predict variations in the slopes over time of patient-perceived relationship

continuity of care, after adjustment for organisational and other population factors at practice level?

METHODS

Existing data were published as spreadsheets by Public Health England, NHS (National Health Service) England, NHS Digital and the Department of Health. These were combined using the common unique practice identification code, into a single database for analysis of practices in England.

Dependent variable

Our study used practice level data. We extracted data from weighted reports by the General Practice Patient Survey (GPPS)[1] for the business years 2011-2012 to 2016-2017, inclusive, to calculate our study variable, patient-perceived relationship continuity, i.e. both having a preferred GP and being able to see that GP. As used by Freeman[2], this was calculated for each practice by multiplying the percentages of:

1. 'Yes' responses to the question 8, 'Have a preferred GP to see or speak to', and

2. The sum of 'Always or almost always" and 'A lot of the time' responses to the question 9, 'Frequency of seeing preferred GP' in those with a preferred GP (the GPPS has validated this combination as representing higher access by presenting confidence intervals in their weighted reports[1, 27]).

Unlike some other questions in the GPPS, these questions have been present and unaltered in all years.

Independent variables

Although our research question focused on the relationship between continuity and deprivation, we recognised that other factors might act as confounders in this relationship, and, thus, needed to be included in our analysis. Practice population and organisational characteristics may alter both workload and the practice's capacity to address this. Based on plausibility guided by a conceptual framework we devised for other studies (Figure 1 [28, 29)], and on data availability at practice level, we included as confounders the following variables, subdivided into:

1. Population-related: practice Indices of Multiple Deprivation (IMD) scores, percentages of the practice population who are aged 75 years or more[30], are of Black or South Asian ethnicity (including mixed ethnicity), are current smokers, report having a long-term condition, and claim disability benefit (having permanent disability)[1]; and

2. Organisation-related: practice list size[31], location of the practice in England (subdivided into the North, Midlands or the South, including London)[32].

Performance-related factors, such as QoF achievement, were not included in our model, as these were not directly relevant to our research question.

The GPPS question, 'Overall experience of GP surgery' reflects the patient's overall assessment of a practice. The sum of the 'Very good' and 'Fairly good" responses (other

options were ‘Neither good nor poor’ and ‘Fairly poor’) was used for a subsidiary univariable analysis.

Missing data

We did not have a full set of values for all of the variables in each year studied. However, because the proportion of missing values never exceeded 6% (see Table 1), we decided not to undertake multiple imputation.

Statistical analysis plan

We undertook descriptive statistics of our variables, univariable analyses of the relationships between pairs of variables, and finally multivariable analyses.

We adjusted for the clustering of measurements within practices by fitting a random intercepts and random slopes model. The *a priori* rationale for selecting this type of model was that we could not assume that the intercepts or slopes for all practices’ levels of continuity over time would be similar. The linear effect of each independent variable on continuity over time was modelled by fitting interaction terms, formed as the product of each independent variable with year. The significance of the interaction term between deprivation and year would indicate whether or not deprivation independently predicted the slope of continuity over time. Statistical significance was set at the 5% level. Post-estimation statistics were used to generate random effects values, predicted values for continuity and to check intra-class correlations.

STATA version 14 was used for all analyses.

RESULTS

Number of practices used in the analysis

Of the 8,160 practices with data, 1,297 were single-handed practices either in 2013, 2014, or 2016 (the years for which these data were available). These were removed as being irrelevant to our research question (practices with one GP are unlikely to offer discontinuity), leaving 6,863 practices in our initial dataset. However, not all practices had complete datasets throughout the entire study period. Practices were excluded if either there were no continuity scores for any of the years studied, or the deprivation score was unavailable. We thus excluded 620 practices (9.0%), leaving 6,243 for the analysis.

Variables excluded from the analysis

Although data were available for other variables, these were excluded from the analysis: the percentage of unemployed patients[1] was highly correlated with IMD scores and had contributed to the calculation of IMD; numbers of GPs and nurses[33, 34]; and payments per registered patient[35-37] as data for these variables were available for only three years, and across these years values were not highly correlated, meaning that imputation would be tenuous with over half of the values needing to be imputed.

Practice IMD scores were available for only 2012 and 2015, but these were very highly correlated (0.98). As 2012 had more complete data, it was used to represent IMD for all years.

Years used in the analysis

We collated data originally for eight consecutive years, from 2009-2010 to the first quarter of 2017. However, in the first two years, 2009-2010 and 2010-2011, data for many of the independent variables were unavailable. In a multivariate analysis, the number of practices analysed would have been reduced, due to missing data, or a very large proportion of missing values would have had to have been multiply imputed. We excluded these two years from the multivariate analysis, leaving us with unimputed data for the six most recent (consecutive) years.

Descriptive statistics

Table 1 gives the distribution of values and the percentage of missing values in each year for all of the variables included in the analysis. Some variables, e.g. continuity, had a normal distribution. Other independent variables had a skewed distribution, e.g. ethnicity percentage.

Univariable analyses

Whilst the mean of relationship continuity declined by 27.5% between 2012 and 2017, the standard deviation was fairly constant. The coefficient of variation, calculated by dividing the standard deviation by the mean, increased steadily and substantially between 2012 and 2017 (Table 2), indicating increased relative variability.

Practices were divided into deciles after ranking IMD scores. Mean unadjusted continuity levels for each deprivation decile declined similarly between 2012 and 2017 (Figure 2), although the cross-sectional correlation between continuity and IMD was negative in all years.

The Pearson correlation between continuity and good overall experience was moderately positive and consistent (0.49-0.51) for 2012-2017 (Table 3). Good experience was more positively correlated with being able to see a preferred GP (0.57-0.58) than with having a preferred GP (increasing from 0.21 in 2012 to 0.29 in 2017).

Supplementary analyses

Although our research question asked whether deprivation predicted variations in a specific metric of continuity, i.e. its slope over time, other associations between continuity and deprivation are possible and worth examining. In cross-sectional regressions, deprivation, as well as most of the independent variables used as confounders in our model, predicted, with small size effects, variations in continuity for all six years from 2012 to 2017. Increases in deprivation score, list size, Black and South Asian ethnicities and, in some years, smokers predicted lower levels of continuity, but increases in over 75s, and in some years, having a long-term condition and claiming disability predicted higher levels of continuity.

Mixed effects multi-level regression

When the model was run for 2012-2017 (Table 4), the practice IMD score did not predict variations in the slope of relationship continuity, after accounting for the effects of organisational and population confounding variables. Of these confounding variables, five (using their interactions with year) predicted variations in the slope of relationship continuity either positively (less decline with higher values) - Black ethnicity, South Asian ethnicity; or negatively (greater decline with higher values) - list size, over 75s, and self-reported long-term condition. As the effect sizes were small, significance may be partly due to the large sample size: for each 1% increase in the percentage of over 75s or in those with long term conditions, continuity slopes were, respectively, 0.059% and 0.013% steeper per year; for each 1% increase in the percentages of Black and South Asian ethnicity, continuity slopes were, respectively, 0.025% and 0.010% less per year. The remaining three confounder variables were not significant: smokers, with permanent disability, and geographical location of the practice.

The intra-class correlation within our model measured the proportion of the variation in continuity at the practice level. This was 0.804 (80.4%), justifying the use of a multi-level model.

DISCUSSION

Summary

Relationship continuity of care declined by 27.5% between 2012 and 2017, while relative variations in continuity increased between practices. Deprivation scores did not predict variations in the decline of relationship continuity at practice level, after accounting for the effects of organisational and population confounding variables, which themselves did not predict, or weakly predicted with very small effect sizes, the decline of continuity.

Strengths and limitations

The study's strengths are the longitudinal analysis (unlike previous studies) using a robust statistical model, and the large sample size (all English practices with >1 GP), including recent (2017) data with low levels of missing values. For our study variable, we chose an appropriate metric at practice level[2].

However, there are limitations. We investigated relationship continuity only, and this is difficult to measure. The GPPSs have had low response rates, largely addressed by a sophisticated weighting system[38]. The GPPS-derived variables used were subjective measurements with no independent objective confirmation. Other unknown or unmeasured variables (possibly related to factors listed below) that might predict continuity or affect the adjusted slope were not available. By not using patient level data, we were unable to establish relationships between deprivation and the slope of continuity at the individual level.

Comparison with existing literature

Factors other than deprivation may be implicated in the decline of continuity. Workload has steadily increased due to: an ageing population with more morbidity, the Quality and Outcomes Framework (QoF) incentivising proactive care[39], and work shifting from secondary care. Primary care services have become more fragmented, due to contract changes that allow alternative providers[39], and an increasing proportion of part-time or locum clinicians in the workforce[33,34]. The proportion of total NHS spending allocated to primary care has declined[40]. Policies extending opening hours and seven-day working will lead to prioritising rapid access over continuity, especially if practices cannot find sufficient capacity to cope with growing demands.

Our analysis shows that, in the first 3 years after introducing the requirement for named GPs, continuity declined more in practices with higher percentages of over 75s or of those with chronic illness. However, it may be too soon to fully evaluate the effectiveness of this new policy.

The decline in continuity coincides with reports of lengthening waiting times for routine GP appointments[41] and an increase in non-elective hospital admissions in England of 11.5% between 2011-2012 and 2016-2017[42]. Although there is an association between continuity and admission rates[15], we are unable to say from our study whether and to what extent the decline in continuity was a factor in the rise in admissions.

We found that continuity and good overall experience were moderately correlated. Continuity is associated with higher satisfaction and with greater patient trust[43]. However, if declining continuity were to result in lower satisfaction, then this might influence in the longer term how patients use services (e.g. more emergency department and private GP usage), or drive policy changes (e.g. further re-organisations of primary care).

Implications for research and practice

Greater relationship continuity of care is one mechanism for delivering safe, efficient and coordinated care to increasingly complex patients. We hope to raise awareness of the extent and nature of the decline in continuity.

How much decline is due to workload, part-time doctors, or other factors? More detailed work within practices would be useful. This might include quantifying how many professionals are seen by individual patients, describing the characteristics of those patients who consult with numerous professionals, examining pathways (structures and processes, including appointment systems, telephones, reception configuration, teams), and reviewing policies (e.g. priority groups of patients, in larger practices using smaller teams). The RCGP toolkit[44] will help practice teams to better measure continuity, undertake appropriate interventions, and audit the changes.

The contractual return to a named doctor is unlikely to improve continuity unless the causes of its decline are found and tackled. Measures to maximise continuity need to be evidence-based, feasible for individual practices without detriment to overall service delivery, and lead to improved health outcomes.

ADDITIONAL INFORMATION

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Ethical approval:

Ethical approval was not required, as the study used only published data with no individuals identified.

Competing interests:

None

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ABBREVIATIONS

CCG Clinical Commissioning Groups

GMS General Medical Services

GP general practitioner

GPPS General Practice Patient Survey

IMD Indices of Multiple Deprivation

NHS National Health Service

NICE National Institute for Health and Clinical Excellence

QOF Quality and Outcomes Framework

PHE Public Health England

RCGP Royal College of General Practitioners

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TABLES AND FIGURES

Table 1: Descriptive statistics of variables used

Variable	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Normally distributed	*Mean (standard deviation); % missing*	*Mean (standard deviation); % missing*	*Mean (standard deviation); % missing*	*Mean (standard deviation); % missing*	*Mean (standard deviation); % missing*	*Mean (standard deviation); % missing*
% Continuity[1]	37.5 (13.4); 1.5	35.9 (13.6); 1.1	34.3 (13.5); 0.9	32.1 (13.4); 1.4	30.1 (13.1); 1.4	27.2 (13.1); 3.4
% Has preferred GP (Q8)	56.2 (11.6); 0.11	55.8 (11.5); 0.02	55.0 (11.4); 0.00	52.1 (12.0); 0.00	49.7 (11.8); 0.00	46.9 (11.9); 1.7
% Able to see GP always, almost always or a lot of the time (Q9:)	65.2 (15.6); 1.2	62.8 (16.2); 0.80	61.0 (16.8); 0.66	59.8 (16.7); 1.1	58.4 (16.9); 1.1	55.5 (17.8); 3.1
% Good overall appointment experience (GPPS-Q18)	88.5 (7.4); 0.11	87.1 (8.1); 0.02	86.1 (8.6); 0.00	85.3 (9.3); 0.00	85.6 (9.0); 0.00	85.3 (9.4); 1.7
% practice list aged 75 years or more (PHE)	7.6 (3.1); 0.0	7.7 (3.1); 0.0	7.8 (3.1); 0.0	7.8 (3.2); 0.0	7.8 (3.2); 0.005	7.9 (3.3); 1.9
% self-reported long-term condition (GPPS Q31)	53.1 (7.4); 0.11	53.5 (7.7); 0.02	53.9 (7.7); 0.0	54.0 (7.9); 0.0	53.3 (7.8); 0.0	53.7 (7.8); 1.7
Skewed distribution	*Median (interquartile range); % missing*	*Median (interquartile range); % missing*	*Median (interquartile range); % missing*	*Median (interquartile range); % missing*	*Median (interquartile range); % missing*	*Median (interquartile range); % missing*

List size (QOF)	7060 (4685, 10136); 0.08	7141 (4750, 10228); 0.08	7212 (4808, 10312); 0.21	7321 (4898, 10453); 0.10	7454 (5038, 10677); 0.0	7718 (5211, 10959); 1.9
% Black ethnicity (GPPS Q52)	0.0 (0.0, 2.8); 5.6	0.0 (0.0, 2.7); 5.7	0.0 (0.0, 2.7); 4.1	0.0 (0.0, 2.9); 4.1	0.6 (0.0, 3.1); 1.9	0.6 (0.0, 3.4); 4.3
% South Asian ethnicity (GPPS Q52)	1.0 (0.0, 4.1); 4.9	0.9 (0.0, 4.1); 4.9	0.9 (0.0, 4.3); 3.4	0.9 (0.0, 4.3); 3.6	1.1 (0.0, 5.1); 2.3	1.2 (0.0, 5.0); 4.1
% Permanently sick or disabled (GPPS Q53)	4.2 (2.5, 6.6); 1.0	4.0 (2.3, 6.4); 0.62	3.9 (2.1, 6.2); 0.70	3.7 (2.1, 6.1); 0.88	3.7 (1.9, 5.9); 0.3	3.6 (1.9, 5.8); 2.2
% Self-reported smokers (GPPS Q59)	18.2 (14.1, 3.0); 0.14	17.2 (13.1, 1.8); 0.11	16.6 (12.6, 1.5); 0.08	15.8 (11.9, 0.6); 0.24	16.0 (12.1, 0.5); 0.03	15.1 (11.1, 9.7); 1.7

[1] Continuity was calculated by multiplying the scores of specified responses to two questions in the GPPS: Q8, Has a preferred GP ('Yes' answer), and Q9, Frequency of seeing preferred GP (higher level of access: the sum of 'Always or almost always" and 'A lot of the time' answers),The GPPS responses are weighted and in the data presentation, a 95% confidence interval (upper and lower) is given for each practice of the combined estimates of the two options

Table 2: The variability of relationship continuity of care in England from 2010 to 2017

Year	Co-efficient of variation (standard deviation/mean)
2012	**0.36**
2013	**0.38**
2014	**0.39**
2015	**0.42**
2016	**0.44**
2017	**0.48**

Table 3: Pearson correlation between satisfaction (good overall experience) and other variables

Year	Continuity	Has preferred GP	Able to see preferred GP	IMD 2012
2012	0.49	0.21	0.57	-0.27
2013	0.49	0.21	0.57	-0.27
2014	0.50	0.21	0.57	-0.25
2015	0.50	0.25	0.58	-0.28
2016	0.49	0.27	0.57	-0.30
2017	0.51	0.29	0.58	-0.28

Table 4: Results of mixed-effects multi-level regression, with dependent variable = Continuity (product of: Has preferred GP x Sees preferred GP)

Number of groups (practices analysed) = 6,242

Number of observations = 33,933

Significant predictors are in **bold**

Independent variable (interaction with year)	Coefficient	95% confidence interval	p-value (significance)	Size effect of significant predictors (change in slope of continuity for each year if variable increases by 1%, unless otherwise specified)
IMD decile	0.011	-0.015, 0.037	0.40	
List size	**-0.000036**	**-0.000047, -0.000025**	**0.00**	**-0.036% per 1,000 patients**
Black ethnicity	**0.025**	**0.015, 0.034**	**0.00**	**0.025%**
South Asian ethnicity	**0.0099**	**0.0051, 0.015**	**0.00**	**0.010%**
Aged 75 years or more	**-0.059**	**-0.080, -0.038**	**0.00**	**-0.059%**
Smokers	0.0025	-0.0058, 0.011	0.56	
Claiming disability	0.0091	-0.0077, 0.026	0.29	
With chronic condition	**-0.013**	**-0.021, -0.0063**	**0.00**	**-0.013%**
Sub region[1]	0.014	-0.051, 0.078	0.68	

[1] North was the reference sub-region